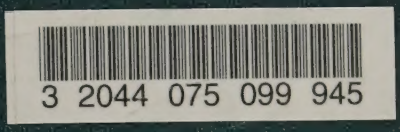
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SIXTH ANNUAL REPORT

OF THE

STATE BOARD OF HEALTH

OF

NEW YORK.

BOSTON MEDICAL
JAN 10 1887
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TRANSMITTED TO THE LEGISLATURE MARCH 19, 1886.

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THE STATE BOARD OF HEALTH OF NEW YORK.

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ERASTUS BROOKS, West New Brighton, Richmond county.
J. SAVAGE DELAVAN, M. D., Albany. *
GEORGE W. COOKE, M. D., Kingston.

Appointed by the Governor from the Health Commissioners in Cities.

EDWARD M. MOORE, M. D., Rochester.
WOOLSEY JOHNSON, M. D., New York.
ALFRED MERCER, M. D., Syracuse.

Ex-Officio Members.

WM. M. SMITH, M. D., Health Officer of N. Y. Quarantine, S. Island.
JAMES T. GARDINER, Superintendent of State Survey.
DENIS O'BRIEN, Attorney-General.

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DR. EDWARD M. MOORE, *President*, Rochester.
DR. ALFRED L. CARROLL, *Secretary*, New Brighton, Staten Island.
FREDERICK CARMAN, *Assistant Secretary.*

State Superintendent of Registration and Vital Statistics.

DR. ALFRED L. CARROLL, as Secretary of the Board.

* Deceased.

STATE OF NEW YORK.

No. 83.

IN ASSEMBLY,

March 19, 1886.

SIXTH ANNUAL

REPORT OF THE STATE BOARD OF HEALTH.

STATE OF NEW YORK:

Executive Chamber,
Albany, *March* 18, 1886.

To the Legislature:

I have the honor to transmit herewith the Sixth Annual Report of the State Commissioners of Health, together with appendix and maps.

DAVID B. HILL

JAN 10 1887

REPORT.

To the Hon. David B. Hill, *Governor of the State of New York:*

Sir — To secure the formation of local boards of health and to aid them in the work of protecting the lives and health of the citizens in their respective localities has always been held as a work of primary importance by the State Board of Health. During the past year a large number of new boards of health have been formed, but the increase in number is even of less importance than the improvement in their working power, due to the gradual perfection of the law under which they work.

As defects in this law became apparent, recommendations have been made to the Legislature for amendments. The law of its action as well of the being of the State Board of Health was passed in 1880. The board then formed was in many respects an entirely new organization, and so also was the general system of health machinery. A State system of registration of births, deaths and marriages had previously existed under the general supervision of the Secretary of State, and to this established but desultorily performed work, the State Board succeeded as far as its supervision related, a central bureau of registration being added. But this general plan was not only new to the State but largely original as a system. Its general plan was most admirable. Prior to its adoption the system had been followed of caring for the public health by local laws, conferring on officers of counties, cities, villages, and towns authority in their respective localities. The new system, not deviating widely from what had become established usage, retained the executive powers with the localities, suppressing even the authority of counties, and recognizing only towns, cities and villages, and combining them all through the medium of one central board which should stimulate them to action, be advisory resource, and in case of the last necessity, only by mandatory action.

As might have been anticipated, points of weakness and ambi-

guity in the law were developed in the experience of its operation, and in 1885 a new law was prepared embodying all the salient features of the old, and introducing such new provisions as had been shown to be necessary both as regards the perfection of registration of vital statistics and as regards the sanitary powers of local boards. The efficiency of the work after the first year's trial demonstrated a decided increase in the necessity and value of the law of 1880, and its later amendments.

The increased activity of the local boards, as regards sanitary work, is felt in the larger demand upon the central office for advice and assistance. To render this is one of the important duties of the State Board. The personnel of the local boards is constantly changing, new elective officers taking the places of those before in service, and bringing persons unfamiliar with the duties of sanitary administration into office. There is consequently constant inquiry and correspondence regarding the routine of work and the most elementary questions of sanitary requirements. It is but natural that difficulties should constantly arise, and appeals be made to the State Board when necessary. This work of sanitary correspondence with the local boards, giving them the accumulated experience of the State Board in sanitary matters, has already become one of the most important features of the central sanitary service.

Besides questions that can be met by correspondence or personal advice, there are many which can only be answered by a local study of the conditions that may exist through representatives of the central board, who are special experts in the matter at fault. An important element in the sanitary machinery of the State is the force of sanitary inspectors, engineers and chemists which the central board requires to meet the frequent emergencies of educated investigation. This is the most economical way in which the State can supply to every locality the benefit of the best expert advice in matters affecting the public health. The reports of the different committees show how extensively this work has been done during the year. It would be a matter of economy, in the judgment of the Board, if this element of its work and the resources at its command were still further enlarged, as far as its assistance in chemical analysis is concerned. The central office needs at its command a well-furnished laboratory for the investigation of potable waters, foods, drugs, and in regard to which there is a steady call for advice.

The perfection of the State system of registration of vital statis-

tics is of importance scarcely second to that of the formation and instruction of local boards of health. The development of this work has required years of constant effort, and the registration is yet far from complete. Progress toward this work is, however, steady, and the committee on vital statistics report a large increase in the number of returns received over previous years. Every effort will be continued to make it uniform and thorough. It is already so perfect in many places as to form a reliable basis for the investigation of the causes of preventable disease.

The monthly bulletin presents a summary of the mortality of the State, including not only the returns that are received from the three millions of the population of the State that are under the Board's jurisdiction, but also of most of the large cities which are by law exempt from its responsible charge. The prevalence of certain classes of preventable disease in particular localities, as shown by these bulletins, has enabled the Board to call attention of the local authorities to the special dangers existing within their jurisdiction, and to advise them as to the general character of the remedies to be applied. It will appear by a study of the bulletins which will be found accompanying this report, and from the comments upon it of the committee on vital statistics, that a record is made of a little more than 80,000 deaths in the State, and that there are, besides these, some 7,000 or 8,000 more which are accounted for on the recording registers, but not printed in this monthly issue. Assuming the probable mortality of the State to be 100,000, it appears that registry has been secured of about nine-tenths of all that occur. By stimulating the organized boards to more perfect work and securing the organization of a considerable number of boards, not yet effected in the more retired parts of the State, further completeness will be secured. The routine of registration is found of secondary importance in keeping up the activity and vitality of local health organizations.

The character of the prevailing diseases in the State during the past year is fully set forth in the report of the Secretary, in the appendix, and a description is given of the measures taken by the State Board, regarding small-pox and other epidemics threatening the State. The power of vaccination in preventing the spread of small-pox has been thoroughly demonstrated during the past year. Although at different intervals since March, twelve cases of small-pox have been reported to the State Board of Health, from localities where, under ordinary circumstances, the contagion would have been

almost certain to spread widely, in only two instances outside of the cities excepted from the operations of the general act, has there been any extension beyond the initial focus. One of these was a nurse who supposed herself protected by a long passed attack of variola and who was not re-vaccinated.

In marked contrast to such fortunate results was the epidemic raging in Montreal among the un-vaccinated. There can be little doubt that the State was saved from a severe epidemic by the great activity of the local and State sanitary authorities. The thorough vaccination practiced will have an important effect in protecting from small-pox for a number of years, and the successful resistance of the invasion of the Montreal epidemic adds greatly to the confidence in the security which may be obtained by thorough sanitary work. The fear of approaching cholera has awakened renewed interest in questions connected with public sanitation. In many places this agitation will not, however, be allayed, until important sanitary reforms have been executed.

SEWERAGE.

Works of sewerage and drainage are greatly needed in many localities. The execution of such works has been retarded by the great cost of many sewerage plans and by the scepticism which still exists among many people, as to the importance and value of removing all sewage and foul wastes from the neighborhood of human habitation.

Another hindrance to the progress of sewerage in this State is the difficulty of disposing of sewage without creating a nuisance. The so-called separate system of small-pipe sewers, carrying sewage only with automatic flushing tanks, recommended itself to the Board at an early day on account of its small cost and superior cleanliness. The experience of the Board during the past year has accorded with that of previous years in respect to the adaptability of the separate system to the greater part of the small villages and cities of the State.

The working of this system in places where it has been tried for a number of years has been re-examined by direction of this Board during the past year, and the results are given in the report of the committee on drainage, sewerage and topography. We commend this report to the consideration of local authorities in this State who are considering the question of sewerage and drainage. The Board has constantly been called upon for expert advice and assistance from

localities requiring aid, that they could not otherwise secure, in investigating the prevalence of disease. While the want of public sewerage has proved one of the most important factors in the development of disease, the want of properly devised house drainage in sewered towns is often a potent cause of illness. The importance of having municipal plumbing regulations and a thorough inspection by skilled and responsible officials becomes yearly more apparent. It is to be hoped that this system of municipal regulations for plumbing which has proved so successful in New York and Brooklyn will be widely extended over the State.

Drainage.

In many large districts the health of thousands of people is seriously impaired by the saturation of the soil. Not only does this refer to the marshes from which miasms arise and are borne over the surrounding tracts, but to regions where the ground-water is so high as to produce damp cellars and damp soil around the dwellings.

The diseases fostered by these conditions,— malaria, rheumatism, consumption, cerebro-spinal meningitis,— and indirectly others, are rife in many populous localities.

In a number of places where abandoned canals belonging to the State were the cause of complaint, drainage works have been executed with the result of producing marked improvement in the health of the localities. The plans made by the Board during the past year have not been fully carried out, but will doubtless be completed during the next season.

There are various great swamps varying from one to several thousand acres in extent, and situated in many counties both in the southern, central, western and northern parts of the State, which are exerting a most harmful influence over the people who live about them. They contain in the aggregate a goodly number of acres, which, if reclaimed, would be among the richest and most fertile lands of the State. Under the present general Drainage Act it has proved impossible to secure the drainage of these tracts. After careful investigation of the causes of the failure of most efforts which have been made for extensive drainage in the State of New York, the Board recommended to the last Legislature the passage of an act, a copy of which is printed in the fifth annual report. It involved the principle of loaning State aid in the construction of the large outfall channels which are the essential basis of any system of

extensive drainage. The aid loaned by the State was to be repaid with interest by the localities, during a term of years sufficient to enable the land to become reclaimed and productive. The act recommended did not become a law, but the Board is confident that little or nothing can be done to reclaim the great swamps of the State until such an act is passed.

WATER SUPPLY.

The experience of the past year has added new proof that one of the gravest causes of preventable disease in this State is the drinking of impure water. The protection of private sources of water supply can only be accomplished by educating the owners of wells, springs and their surroundings in a knowledge of the watchfulness required to prevent the contamination of the house supply. To this end by investigations, by letters and by reports to local health authorities the State Board is endeavoring to awaken the people and instruct them as to the means necessary to prevent the pollution of potable waters.

The experience of the Board having shown that existing laws were not adequate to secure the thorough sanitary protection of public water supplies, an act was recommended to the last Legislature, which became a law, authorizing the State Board to make rules and regulations for the protection of any public water supply, which rules should have the force of law when approved by the judge of the county in which the water supply was located. Under this law rules were made for the sanitary protection of the water supply of the city of Rochester and the village of Fredonia. The report of the executive board of Rochester shows that the result has been a most effective protection from sources of contamination that seriously menaced the purity of their supply. It does not appear that the maintenance of these regulations has caused any hardship to property-holders upon the water-shed, but on the contrary, has resulted in a positive sanitary benefit to them.

In investigating the occurrence of preventable sickness in localities especially afflicted, in determining the causes operating, and in devising proper remedies for the insanitary conditions discovered, the Board requires the aid of expert skill of the highest order and the widest experience. Combined sanitary and engineering perception and knowledge is needed to detect the various dangers which threaten the public health and to give wise and efficient advice to suffering localities.

The experience required can only be obtained through years of actual investigation of a great variety of cases, such as come before a central board. It is, therefore, of the greatest importance, for reasons of public health and general economy, that the State Board of Health should be able to retain in its employment men of scientific attainments, whose accumulated experience in the solution of difficult sanitary questions becomes of inestimable value to localities needing sanitary advice.

The Board has thus far fortunately been able to command the services of such men to the extent of its limited means of remuneration; and so far as its funds have gone, expert advice and assistance have been gladly given to all localities needing help. The pressure upon the Board, however, for expert service in investigating the occurrence of disease and devising remedies for prevention has been much greater than its ability to respond. It is the duty of the Board to state that during the year many localities have needed expert help which they were not themselves able to secure, and which the Board for want of means could not supply. We feel sure that larger means at the disposal of the Board would result in an improvement in the public health of many localities that the Board is not now able to help except in words of general advice.

EDWARD M. MOORE, M. D.,
President.
ERASTUS BROOKS.
WOOLSEY JOHNSON, M. D.
ALFRED MERCER, M. D.
GEORGE W. COOKE, M. D.
DENIS O'BRIEN,
Attorney-General.
WILLIAM M. SMITH, M. D.,
Health Officer of the Port.
ALFRED L. CARROLL, M. D.,
Secretary.

REPORT

OF

EXECUTIVE AND FINANCE COMMITTEE.

REPORT

Of the Executive Committee on the Work and Expenditures of the Board from its Organization to the Close of its last Fiscal Year, September 30, 1885.

Organization and Duties.

On the 29th of May, 1880, the State Board of Health was organized and at once set about the discharge of the extensive range of duties specified in its organic law, chapter 322 of 1880. These duties are thus stated:

To take cognizance of the interests of life and health among the people of the State.

To make inquiries in respect to the causes of disease, especially epidemics.

To investigate the effects of localities, employments and other conditions upon the public health.

To supervise the State system of registration of births, marriages and deaths, and the registration of prevalent diseases.

To prepare forms for obtaining and preserving such records.

To insure the faithful registration of the same in the several counties and in the central bureau of vital statistics at the capital of the State.

To prepare forms with proper coupons attached for, and prescribe rules regarding, the issue and use of transfer permits to be issued by local boards of health for the transportation of dead bodies for burial beyond the limits of the county where the death occurs.

To secure compliance with these rules on the part of every common carrier or person in charge of vessels, railroad trains or vehicles, and

To examine and report upon nuisances affecting the security of life and health in any locality where the people, unable to gain redress from their local officials, seek the aid of the State Board of Health by petition to the governor.

Emphasis was given to these duties by chapter 431 of 1881, chapter 351 of 1882, and chapter 270 of 1885.

APPROPRIATIONS AND EXPENDITURES.

To commence this important sanitary undertaking the Legislature voted	$15,000 00
Additional appropriations have been made as follows:	
For year from October 1, 1881, to September 30, 1882.	20,000 00
For year from October 1, 1882, to September 30, 1883.	15,000 00
For year from October 1, 1883, to September 30, 1884.	20,000 00
For year from October 1, 1884, to September 30, 1885.	20,000 00
Total	$90,000 00

The expenditures of the board for the above five years and four months of its existence, as shown in detail in its six reports, aggregate	$89,123 98
Or an average annual expenditure of	$16,710 72

Subtracting the expenditures from the appropriations, there is found to be an unexpended balance to the credit of the Board on October 1, 1885, of $876.02. The Legislature appropriated for the fiscal year ending September 30, 1886, the sum of $20,000, so that for the current year to sustain its work the Board has this legislative appropriation of $20,000 plus $876.02 of unexpended balance at the end of the last fiscal year, or $20,876.02.

PUBLIC SERVICE RENDERED.

The first three reports of the Board give in concise form the results of its effort to call into existence, hampered as it was with imperfect and ambiguous laws, local boards of health in all the towns, villages and cities of the State, numbering over 1,300, and to put them in communication with the central office. The service being new, it was difficult to induce hearty compliance with the law and co-operation in a work essentially in the interests of the people.

The law imposed a two-fold duty on these boards (and upon the State Board the duty of enforcing it) first concerning the registration of vital statistics, and secondly in reference to the sanitary security of the community. The efforts of the State Board of Health were accordingly put forth in both of these directions. Forms for certificates of births, deaths and marriages, for burial and transmit permits, as well as for registers in which to record vital statistics, had to be prepared and sent as models to every local board

of health. Information how to record these vital records and how and when to forward the original certificates to the State bureau had also to be given and arrangements made with a printer to furnish these registry equipments at the lowest possible rate. Models for sanitary rules and regulations for local boards of health had also to be prepared, involving the consideration of the wants of these local boards as well as their legal powers. As each local board organized, estimates of the registry supplies needed, based upon population, had to be prepared and sent, so that some correct idea might be formed of the expense to each town, village or city. It is needless to say that this preliminary work entailed a vast correspondence as well as the issuance of over fifty different printed circulars of information. In addition to this numerous sanitary investigations were undertaken, epidemics grappled with and stamped out, and the people instructed as to the connection between insanitary conditions and disease, suffering and financial loss.

The position the Board attained at the end of its third year of public service was well summed up in the words of the late secretary, Dr. Elisha Harris.

"Called into existence by the Legislature of 1880, after twenty or more of the States had founded some form of central sanitary service, and after the Nation had gratefully witnessed upon a vast scale the proof that sanitary protection and vigorous health in time of war are equivalent to the strength of armies, the State Board of Health of New York organized its methods of public service on the basis of a broad reliance upon the share and enlightened concern which the people would have in this work and the objects of health laws. The expectations of the Board in this particular are being abundantly realized, for the people are concerned, and in their primary civil divisions of townships, cities, villages and school districts, are giving practical effect to whatever this Board has undertaken to do in compliance with the purposes and powers defined in the statutes relating to health.

"Though not wanting in certain kinds of authority, the policy of this department has mostly been directly the converse of centralization or dictation. From first to last the service has been chiefly one of studious instruction and guidance, the co-ordination of means to practical ends, bringing results of investigation of subjects of general importance to the public health to bear upon the sanitary welfare of the particular communities which seek the aid of the Board."

A review of the work of the last two years, when the results of earlier efforts began to manifest themselves and registration had commenced in the Central Bureau, will afford some idea of the extent of the Board's public service to the State.

The work of the year ending September 30, 1884, may be briefly summarized:

IN THE DEPARTMENT OF VITAL STATISTICS.

1. During this year for the first time registration in its three branches, births, marriages and deaths was steadily maintained, and special clerks assigned for each branch.

2. On the death of Dr. Harris, it was found, that the registration in all its branches was nearly two years behind, owing to the fact that the main efforts of the secretary had been directed toward the then more important work of explaining the law, enlightening the people and inducing organization of local boards. How to write up these accumulated arrearages without enlarging the office staff till such enlargement became imperative was then a serious question. It was finally decided to transfer the regular clerks to current work, and to employ a number of temporary assistants to bring up the arrearages, paying them by the piece. This was done, and a beginning made in March, 1884.

3. A monthly bulletin of mortality was also issued, the first number appearing in April, so that while arrearages were being recorded for the legal value they might have in the settlements of estates, the current mortality of places was set before the people as the best argument of the need and value of sanitary work.

4. Coincident with the issuance of the monthly bulletin became the need of an office mailing list, prepared in such manner as on the one hand to embrace all parties who ought to receive the Board's publications regularly, and on the other to obviate the long and tedious process of pressing into service all the clerks in the office for the purpose of doing this work by the pen. The addresses were prepared in sheets printed, perforated and mucillaged like postage stamps, so that nothing further is needed in despatching any publication than to give the office boy the regular number of sheets to paste addresses on as he would postage stamps.

5. The preparation of a tabulated nomenclature of causes of death, including names of 500 diseases, in English, French, German and Latin. This is designed for use of health officers, registry clerks and physicians, to secure uniformity in registration.

In the Department of Sanitary Work.

During the year there was a large demand upon the Board for sanitary service requiring the employment of expert aid; and the report shows the following record:

1. Investigation of pleuro-pneumonia in Flatbush where it was alleged cows suffering from this disease were kept for their milk supply and their flesh sold for food after death.

2. Investigation of the epidemic of diphtheria at Lansingburgh.

3. Issuance and widespread distribution of a sanitary memorandum of duties in the presence of a threatened epidemic of cholera.

4. Examination of the suitability of using an abandoned burial-ground for the erection of a school-house at Port Jervis.

5. The preparation of a law to protect the purity of potable water supplies, framed in response to constant appeals for aid which could not be responded to without additional legislation.

6. The maintenance of an inspection of offensive businesses in Kings and Queens counties, the dissemination of information concerning them, and the public accusation of such as were found to be violating the governor's orders.

7. The investigation of alleged cholera at Hoosick Falls.

8. The investigation of trichinosis at Arietta.

9. The preparation of plans for the drainage of the Chemung canal prism at Horseheads and supervision of work.

10. Investigation of insanitary conditions at Yorktown.

11. Investigation of insanitary conditions at Castleton.

12. Investigation of insanitary conditions at Oneonta.

13. Investigation of insanitary conditions at Valatie.

14. Investigation of insanitary conditions at Port Byron.

15. Investigation of insanitary conditions at Clifton Springs.

16. Investigation of insanitary conditions at Rochester, Ulster county.

17. Investigation of condition of the abandoned Chemung canal north of Elmira city line. Plan prepared for its drainage.

18. Investigation of the insanitary condition of Havana, and preparation of plan for its improvement, including drainage of canal prism.

19. Investigation of large swamp areas, and suggested plan for their sanitary drainage.

20. Investigation of insanitary condition of Saratoga Springs, and suggested plan for its improvement.

21. Investigation of the insanitary condition of Martinville and Beaver creek district, Albany, and plan for remedy.

22. Investigation and report upon insanitary condition of Port Richmond, and suggested remedies.

23. Investigation of epidemic of typhoid fever at Bath, Steuben county.

24. Investigation of village of Malone with reference to its need for sanitary drainage, and report thereon.

25. Investigation of the sewerage of the city of Kingston, and report thereon.

26. Investigation of nuisance at Sucker brook, Canandaigua, and remedies therefor.

27. Investigation of the summit level of the Chemung canal, and plan for its drainage.

28. Investigation of Hoosick Falls, and plan proposed for its drainage.

29. Investigation of Ogdensburg, and its need of sewerage, with report thereon.

30. Investigation of sanitary condition of Syracuse, with report thereon.

31. Further investigation and conclusion of the examination of the alleged nuisances at Glen Cove, and report thereon.

For year ending September 30, 1885, the following is a summary of the work accomplished :

I. VITAL STATISTICS.

(1.) The work of bringing up arrearages by means of temporary assistants, which was begun in March of the previous year, has been continued, and 51,800 certificates of births, deaths and marriages recorded in this way, besides the preparation, with dictionary, alphabetical precision, of four indexes, each index containing 21,000 names, with reference to volume and page of register in which particulars regarding every name may be found.

(2.) A clerk has also been kept busy on the current Death Register, another on the Birth Register, and a third on the Marriage Register, so that no further arrearages have been allowed to accumulate.

(3.) The Bulletin of Mortality has been issued monthly, and has been growing in fulness and accuracy. Several places, notably Troy and Cohoes, where suspicion as to the completeness of their mortality returns had been entertained, were visited by the Assistant Secretary, the records of cemeteries as to interments taken and compared with the actual return of deaths. The discrepancies thus ascertained formed the basis of correspondence with local boards health that has resulted in reforms beneficial to sanitary service.

(4.) The weakness of the law providing for registration having frequently been demonstrated in the efforts of the Board to induce local registration, an effort was made during the past year to remedy existing defects. It was found necessary to frame an entirely new law, preserving all the salient features of the old, and introducing such new provisions as the experience of the Board seemed to warrant. This resulted in the passage of chapter 270 of the laws of 1885, by which local boards have since worked and are now satisfactorily working. The main features of the new law are:

1st. The placing of the obligation to return to the local registrar certificates for registration

(a) In the case of births, on the parent or guardian,

(b) In the case of marriages, on the groom,

(c) In the case of deaths, upon the undertaker, or person having charge of the body.

2d. The making more definite the powers of local boards of health, and giving to the State Board authority to call upon them to convene whenever it is considered necessary in the interests of the public health.

(5.) A form for the recording of still births has been prepared and sent to every local board of health, so that the number of such occurring in any locality will be preserved for the sanitary information conveyed.

(6.) Two new record books have been devised and put in operation; (a) one containing, alphabetically arranged, an account with every local board of health in the State, showing the monthly receipts of certificates of births, deaths and marriages and still births; (b) The other containing the personnel of every local board of health, and the post-office address of the different members.

These form the two working factors in the bureau; the one shows the boards that are delinquent, and the other their post-office addresses, so that an active correspondence may be maintained to bring them up to the proper standard.

2. SANITARY WORK.

During the year there has been a considerable tax on the engineering and sanitary resources of the board. The following are among the chief works undertaken:

1. Investigation of the insanitary condition of the Albany basin, and plan for its improvement.

2. Preparation of rules and regulations for the protection of the purity of the water supply of the city of Rochester.

3. Investigation of and report upon epidemic of diphtheria at Sandy Hill, involving an engineering examination of the locality and chemical and biological examination of the water supply.

4. Preparation and approval of further plan for the drainage of the Chemung canal prism in the village of Havana.

5. Investigation of the defilement of the potable water supply of the village of Fredonia, and the preparation of rules for the preservation of its purity.

6. Investigation of and report upon the drainage of a swamp in the town of Westchester, near Clason's Point.

7. Preparation of a further plan for the drainage of the prism of the abandoned canal, between the villages of North Elmira and Pine Valley.

8. Investigation of the drainage of the new court-house in the city of Lockport, and report thereon.

9. Investigation of and report upon Elmira Reformatory sewer, and plan for its construction.

10. Report upon the sewerage of the village of Warsaw, and plan for the disposal of its sewage.

11. Investigation of and report upon a malarial nuisance in the town of Florida, Montgomery county.

12. Investigation of and report upon a malarial nuisance at Fairport.

13. Investigation of and report upon the sewerage of Middletown, Orange county.

14. Investigation of and report upon the insanitary condition of Canajoharie.

15. Investigation of and report upon the insanitary condition of Johnstown.

16. Investigation of and report upon malarial conditions at Harrison, Westchester county.

17. Investigation of and report upon a slaughter-house nuisance at Havana.

18. Investigation of and report upon an open sewer nuisance at Cohoes.

19. Investigation of and report upon the insanitary conditions at Rhinebeck.

20. Preparation of plan for the drainage of the abandoned canal at Rome.

21. Preparation of plan for the drainage of the Binghamton Insane Asylum.

22. Investigation, by order of the governor, of a drainage nuisance at Mt. Vernon and preparation of plans for its abatement.

23. Examination of sources of pollution of the water supply of the city of Cortland, and suggested remedies.

24. Various inspections of the condition of factories on Newtown creek and vicinity.

A large correspondence with local boards to induce local action in the removal of nuisances which they were entirely able to deal with unassisted, and various warnings to local boards to institute general vaccination and revaccination in their respective localities to protect the State from the small-pox epidemic then raging in Canada, which has been productive of such good results that the State has been saved from its ravages.

Not over two-thirds of the local boards of the State required by law are making complete returns of their vital statistics to the central bureau. When complete returns are received from all parts of the State, at least three additional recording clerks will be needed for the mere clerical work of registering the records.

SPECIAL WORK INTRUSTED TO THE STATE BOARD OF HEALTH.

Administration of the Law to Prevent the Adulteration of Food and Drugs.

On May 28, 1881, the Legislature passed the law known as chapter 407 of 1881, entitled "An act to prevent the adulteration of food and drugs," which required the State Board of Health within thirty days thereafter to meet and adopt measures for its enforcement and prepare rules and regulations for collecting and examining articles of food or drugs, and for the appointment of necessary inspectors and analysts.

To enter upon this new field of duty, the Legislature voted the inadequate sum of $10,000 and failed to make any further appropriation for the three subsequent years. This disproportion of means to the ends sought will be the more apparent when it is considered that but for *one* branch of this work, that relating to dairy products which the Legislature of 1884 placed under a separate commission, the sum of $30,000 was voted and $50,000 the following year, while for the entire field, during a period of four years from May 28, 1881 to June 13, 1885, but $10,000 was appropriated.

The Board met within the time prescribed by law and decided, as a first step in carrying out the provisions of the act, to make a careful examination of the food and drugs sold in different parts of the State in order to ascertain the nature and extent of the adulteration practiced; also to examine the methods of analysis in use for the detection of such adulterations, and to have presented for the use of those on whom the enforcement of the act would finally devolve the best literature on the subject. The administration of the law was referred to the sanitary committee and the following analysts elected:

Prof. G. C. Caldwell, Ph. D., Cornell University.
Prof. A. H. Chester, Ph. D., Hamilton College.
Prof. E. G. Love, Ph. D., New York.
Prof. S. A. Lattimore, Ph. D., Rochester University.
Prof. Wm. H. Pitt, M. D., Buffalo.
Prof. F. E. Englehardt, Ph. D., Syracuse.
Also two inspectors to collect samples.

The work was divided up among the chemists as follows:

Animal food.

I. Milk fresh and condensed. Undertaken by C. F. Chandler, Ph. D., chairman of the committee.

II. Butter, dairy and artificial, cheese, lard, olive oil and fruit essences. Assigned to G. C. Caldwell, Ph. D., Cornell University, Ithaca, N. Y.

III. Canned meats and animal foods, fresh, smoked, salted, canned, extracts and essences of meat and fish, gelatine and isinglass. Assigned to A. H. Chester, Ph. D., Hamilton College, Clinton, N. Y.

Vegetable food.

IV. Cereals and the products and accessories of flour and bread foods, wheat, rye, barley and rice, oatmeal, cornmeal, sago, tapioca

and leguminous preparations, special artificial foods for infants and invalids, baking powders, cream tartars, bicarbonate of soda, bicarbonate of ammonia, alum powders and the "alum question." Assigned to E. G. Love, Ph. D., New York.

V. Canned fruits and vegetables, preserves, vinegar, pickles, mustard, ginger, spices, antiseptics employed in preserving, glazing and enamel as affecting food articles. Assigned to S. A. Lattimore, Ph. D., University of Rochester, Rochester, N. Y.

VI. Sugars, syrups, molasses, glucose, confectionery, honey and soda-water syrups. Assigned to W. H. Pitt, M. D., Buffalo, N. Y.

VII. Tea, coffee, cocoa Assigned to S. A. Lattimore, Ph. D., University of Rochester, Rochester, N. Y.

VIII. Wines, beers, spirits and cordials. Assigned to F. E. Englehardt, Ph. D., Syracuse, N. Y.

Drugs.

IX. Crude vegetable and animal drugs. Assigned to F. Hoffman, Ph. D., New York.

X. Pharmaceutical chemicals and their preparations. Assigned to F. Hoffman, Ph. D., New York.

XI. Gelatine and sugar-coated and compressed pills of quinine. Assigned to G. C. Caldwell, Ph. D., Cornell University, Ithaca, N. Y.

XII. Granular effervescent salts, fluid citrate of magnesia, seidlitz powders. Assigned to W. G. Tucker, M. D., College of Pharmacy, Albany, N. Y.

The inspectors traveled over the State collecting samples, which were carefully labeled, numbered, recorded and sent to the proper analyst, and in the Second, Third and Fourth Reports are given elaborate reports of the work done, including tables of the articles analyzed, and the results of the analyses, as well as detailed statements of expenditures.

Numerous cases were prepared for prosecution, complaints made, the sellers of adulterated articles arrested, indicted and held for trial.

In regard to milk, that sold by two hundred and fifty different parties was examined, and exhaustive reports written, on milk fresh and condensed; the effect of various kinds of feed upon milk, the brewer's grain question, with microscopic examination and illustrations of cream, pure milk, skimmed milk and unhealthy milk. Cheese and its adulterations were also examined.

Law to Regulate the Standard of Illuminating Oils and Fluids.

On the 6th of June, 1882, the above act was passed. Like the law to prevent the adulteration of food and drugs, its administration was placed upon the State Board of Health, and an appropriation of $5,000 made for its enforcement.

Its execution was also assigned to the Sanitary Committee of the Board, and the work and expenditures will be found set forth in great detail in the second, third and fourth reports of the Board.

The law having fixed the legal flash test for oil at 100 degrees. Fahrenheit, according to the instrument and methods approved by the State Board of Health, it was incumbent upon the Board to determine upon a proper tester and methods by which oils could be examined.

Accurate details of the examination of every tester in use, and of the steps which led to the adoption of the New York State tester, are fully set forth in the published reports.

The oils sold in the State were fully examined, and startling facts disclosed, shedding much light on the origin of kerosene horrors. An oil was found in the market that flashed at the ordinary summer temperature of the laboratory. Several cases were prepared for trial, and a notable conviction secured in Batavia of an agent who had been flooding western New York with a dangerous illuminating fluid. The reports give the details of the work done, the flashing point of the various oils examined, and the efforts, successful and unsuccessful, to secure the indictment and punishment of violators of the law. The result has been to rid the market of a large part of the dangerous illuminators with which it had been previously flooded.

Note.

The last Legislature appropriated $10,000 to administer both the food and drug and oil laws, and three chemists of the Board are actively engaged in this work.

Their reports will be ready for the present Legislature.

Beers and Malt Liquors.

The last Legislature also imposed upon the State Board another specific duty: to examine all the beers and malt liquors brewed or distilled in this State, appropriating $3,000 for the work. Samples representing the product of every brewer in the State have been

collected, to the number of 500 and analyzed. A report on the entire subject is being prepared and will be ready for the present Legislature.

The above summary of the Board's work is respectfully submitted, showing, with entire confidence, that upon close examination it will be found to compare favorably both as to efficiency and economy with any departments of the State's service.

ERASTUS BROOKS,
Chairman.

FINANCIAL EXHIBIT.

Financial exhibit for year, October 1, 1884, to September 30, 1885, total, $25,738.05. Made up as follows:

For members' traveling expenses	$1,113 37
For miscellaneous expenses	3,995 84
For expert services	3,910 96
For salaries and wages	13,056 25
For expressage and telegraphing	230 19
For printing and stationery	3,073 37
For library	103 96
For petty cash	99 11
For furniture	155 00
Total	$25,738 05
Balance unexpended October 1, 1884	$6,614 07
Special appropriation for year	20,000 00
	$26,614 07
Deduct above expenses	25,738 05
Leaving a balance October 1, 1885, of	$876 02

Traveling and Necessary Expenses of Members.

1884.		
Oct. 18.	Erastus Brooks, per itemized account	$96 43
Nov. 15.	James T. Gardiner, per itemized account	15 00
20.	J. Savage Delavan, per itemized account	10 60
Dec. 9.	James T. Gardiner, per itemized account	24 55
17.	Alfred Mercer, per itemized account	52 71
17.	Alfred L. Carroll, Secretary, per itemized account	36 85
25.	James T. Gardiner, per itemized account	43 57
25.	Dr. Edward M. Moore, per itemized account	32 40
29.	George W. Cooke, per itemized account	35 50
30.	Erastus Brooks, per itemized account	50 95
1885.		
Jan. 29.	James T. Gardiner, per itemized account	13 92
Feb. 17.	Wm. M. Smith, per itemized account	25 90
28.	Wm. M. Smith, per itemized account	11 50

1885.			
Apr.	7.	Erastus Brooks, per itemized account.....	$35 55
	16.	James T. Gardiner, per itemized account..	16 60
	20.	E. M. Moore, per itemized account.....	36 68
	28.	Woolsey Johnson, per itemized account...	31 70
May	11.	James T. Gardiner, per itemized account..	21 16
	23.	James T. Gardiner, per itemized account..	17 35
	23.	George W. Cooke, per itemized account...	30 49
	15.	Fred'k Carman, per itemized account.....	9 40
	21.	James T. Gardiner, per itemized account..	23 00
June	4.	Alfred L. Carroll, per itemized account....	6 45
	29.	James T. Gardiner, per itemized account..	17 30
July	2.	Erastus Brooks, per itemized account.....	59 38
	7.	George W. Cooke, per itemized account ...	41 92
	7.	J. Savage Delavan, per itemized account...	13 40
	11.	Alfred L. Carroll, per itemized account....	5 00
	17.	J. Savage Delavan, per itemized account...	24 01
	20.	Fred'k Carman, per itemized account	19 08
	27.	George W. Cooke, per itemized account...	29 80
	28.	Alfred L. Carroll, per itemized account....	19 26
Aug.	6.	Alfred L. Carroll, per itemized account....	19 16
	25.	Edward M. Moore, per itemized account...	35 95
	25.	Dr. Alfred Mercer, per itemized account...	39 58
Sept.	29.	George W. Cooke, per itemized account...	24 36
	29.	Erastus Brooks, per itemized account.....	86 91
			$1,113 37

EXPERT SERVICES.

1884.			
Oct.	14.	O. S. Wilson, services as engineer.....	$170 00
	14.	Arthur Hollick, services as sanitary inspector.....	10 00
	26.	Horace Andrews, services as sanitary engineer	180 00
Nov.	5.	Arthur Hollick, services as sanitary inspector	20 00
	30.	A. D. Lake, report on enteric fever....	10 00
Dec.	11.	Horace Andrews, services as sanitary engineer	200 00
	16.	O. S. Wilson, services as sanitary engineer.	270 00
	17.	O. S. Wilson, services as sanitary engineer.	180 00
	20.	L. McLean, services examining cow stables..	50 00
1885.			
Jan.	5.	Willis G. Tucker, analysis of cheese and water	97 20
	8.	Arthur Hollick, services as sanitary inspector	10 00

1884.			
Jan.	15.	Horace Andrews, services as sanitary engineer	$150 00
	15.	P. C. Curtis, M. D., medical inspection	5 00
	15.	O. S. Wilson, C. E., services as sanitary engineer	80 00
	29.	O. S. Wilson, C. E., services as sanitary engineer	140 00
Feb.	5.	Horace Andrews, services as sanitary engineer	150 00
Mar.	10.	O. S. Wilson, services as sanitary engineer.	200 00
	10.	Horace Andrews, services as sanitary engineer	150 00
April	2.	F. C. Curtis, medical inspection	5 00
	7.	O. S. Wilson, C. E., services as sanitary engineer	180 00
	7.	Horace Andrews, C. E., services as sanitary engineer	150 00
	28.	O. S. Wilson, C. E., services as sanitary engineer	130 00
May	5.	W. G. Tucker, water analyses	35 00
	5.	Horace Andrews, C. E., services as sanitary engineer	70 00
	25.	O. S. Wilson, C. E., services as sanitary engineer	153 00
	25.	Horace Andrews, services as sanitary engineer	150 00
June	4.	Richard Prescott, sanitary engineering	30 00
	19.	Horace Andrews, sanitary engineering	80 00
	7.	James T. Gardiner, sanitary engineering	127 50
	7.	Arthur Hollick, sanitary inspector	30 00
	20.	Wm. Hailes, M. D., biological examination of waters per list	313 26
	23.	F. C. Curtis, medical investigator	10 00
Aug.	3.	Horace Andrews, sanitary engineering	5 00
Aug.	17.	James T. Gardiner, consulting engineer	195 00
Sept.	11.	Horace Andrews, sanitary engineer	20 00
	25.	James T. Gardiner, consulting engineer	150 00
	25.	F. C. Curtis, M. D., medical inspector	5 00
			$3,910 96

MISCELLANEOUS EXPENSES.

1884.			
Oct.	14.	O. S. Wilson, expenses	$66 62
	14.	Arthur Hollick, expenses	5 60
	14.	I. L. Carman, engrossing 8 sheets of death certificates and 47 of births	55 00
	14.	Engrossing 21 certificates of births	21 00

1884.			
Oct.	16.	H. Batchelder, engrossing 88 sheets of death certificates	$88 00
	26.	Horace Andrews, expenses	17 53
	31.	Brace M. Gallien, 125 sheets births	125 00
Nov.	1.	Anna L. Mattimore, 96 sheets deaths	96 00
	5.	Arthur Hollick, expenses	12 30
	15.	I. L. Carman, 30 sheets births	30 00
Dec.	1.	Howard Batchelder, 96 sheets deaths	96 00
	1.	Brace M. Gallien, 110 sheets death	110 00
	1.	Anna L. Mattimore, 75 sheets deaths	75 00
	1.	Anna L. Mattimore, typewriting	22 20
	1.	I. L. Carman, 20 sheets births	20 00
	11.	Horace Andrews, expenses	24 86
	15.	I. L. Carman, 30 sheets births	30 00
	16.	Frederick Carman, expenses	6 05
	17.	O. S. Wilson, expenses	49 36
	17.	O. S. Wilson, expenses	30 56
	17.	Howard Batchelder, 16 sheets deaths	16 00
	29.	J. N. McCormack, subscription to conference of State Board of Health, Washington,	10 00
	29.	George H. Robie, assessments to investigate disinfectants	50 00
1885.			
Jan.	2.	Brace M. Gallien, engrossing 125 sheets births	125 00
	5.	Anna L. Mattimore, engrossing 67 sheets certificates	67 00
	5.	Anna L. Mattimore, typewriting	26 20
	5.	Arthur Hollick, expenses	1 30
	15.	Isabel L. Carman, engrossing 10 sheets births	10 00
	15.	Horace Andrews, expenses	19 74
	15.	F. C. Curtis, M. D., expenses	3 85
	15.	O. S. Wilson, expenses	26 96
	15.	O. S. Wilson, expenses	73 48
	30.	Anna L. Mattimore, engrossing 83 sheets births	83 00
	30.	George H. Allen copying records of interments in Cohoes cemeteries	6 00
Feb.	3.	Brace M. Gallien, engrossing 125 sheets births	125 00
	3.	Horace Andrews, expenses	8 80
	6.	Isabel L. Carman, engrossing 34 sheets births	34 00
Mar.	2.	Anna L. Mattimore, engrossing 55 sheets births	55 00
	2.	Anna L. Mattimore, typewriting	25 46
	3.	Brace M. Gallien, engrossing 100 sheets births	100 00

1885.

Mar.	10	I. L. Carman, engrossing 7 sheets births....	$7 00
	10.	O. S. Wilson, expenses.....	22 08
	10.	Horace Andrews, expenses.....	12 85
	10.	Anna L. Mattimore, engrossing twenty-nine sheets births.....	29 00
	10.	Anna L. Mattimore, typewriting.....	14 00
	10.	Anna L. Mattimore, indexing....	59 04
Apr.	2.	I. L. Carman, indexing.....	24 00
	2.	F. C. Curtis, expenses.....	2 91
	3.	B. M. Gallien, engrossing thirteen and three-fifths sheets births.....	13 60
	3.	Brace M. Gallien, indexing.....	72 00
	7.	O. S. Wilson, expenses.....	31 57
	10.	Horace Andrews, C. E., expenses.....	30
	10.	Isabel L. Carman, indexing.....	24 00
	10.	B. M. Gallien, indexing, etc.....	84 00
	22.	I. L. Carman, indexing, etc.....	24 00
	28.	O. S. Wilson, expenses.....	32 70
May	1.	Anna L. Mattimore, indexing, etc..	75 60
	1.	Anna L. Mattimore, typewriting.....	20 00
	10.	I. L. Carman, indexing.....	9 60
	10.	O. S. Wilson, expenses.....	32 20
	25.	Horace Andrews, expenses.....	18 11
	25.	B. M. Gallien, indexing.....	84 00
June	4.	Richard Prescott, expenses.....	6 40
	4.	Anna L. Mattimore, indexing.....	113 52
	19.	B. M. Gallien, indexing.....	72 00
	19.	Horace Andrews, expenses.....	51 02
July	6.	B. M. Gallien, indexing.....	112 00
	6.	Anna L. Mattimore, indexing, etc	84 92
	7.	James T. Gardiner, expenses.....	21 08
	7.	Arthur Hollick, expenses.....	3 65
	10.	Maria Pratt, indexing.....	48 00
	10.	I. L. Carman, indexing.....	76 00
	20.	B. M. Gallien, indexing.....	56 00
	23.	F. C. Curtis, expenses.....	4 17
Aug.	3.	Horace Andrews, expenses.....	5 15
	6.	Anna L. Mattimore, indexing, etc.....	81 52
	13.	I. L. Carman, indexing.....	36 40
	17.	James T. Gardiner, expenses.....	70 00
	17.	Maria Pratt, indexing.....	96 00
	17.	I. L. Carman, indexing.....	56 00
Sept.	11.	Horace Andrews, expenses.....	2 32
	11.	Anna L. Mattimore, indexing, etc.....	58 02
	25.	I. L. Carman, indexing.....	30 00
	25.	James T. Gardiner, expenses.....	33 55
	25.	F. C. Curtis, M. D., expenses.....	3 85
	25.	Maria Pratt, indexing.....	168 00

1885.			
Sept.	25.	L. W. Pratt, engrossing 100 pages of marriages	$125 00
	25.	Anna L. Mattimore, indexing	40 84
			$3,995 84

SALARIES AND WAGES.

1884.			
Oct.	31.	For amount of pay-roll, October	$1,066 65
Nov.	30.	For amount of pay-roll, November	1,066 65
Dec.	31.	For amount of pay-roll, December	1,085 45
1885.			
Jan.	31.	For amount of pay-roll, January	1,124 99
Feb.	28.	For amount of pay-roll, February	1,124 99
Mar.	31.	For amount of pay-roll, March	1,125 02
April	30.	For amount of pay-roll, April	1,124 99
May	31.	For amount of pay-roll, May	1,124 99
June	30.	For amount of pay-roll, June	1,125 02
July	31.	For amount of pay-roll, July	1,029 15
Aug.	31.	For amount of pay-roll, August	1,029 15
Sept.	30.	For amount of pay-roll, September	1,029 20
			$13,056 25

EXPRESSAGE AND TELEGRAPHING.

1884.			
Nov.	5.	Commercial Telephone Co., October	$5 00
	5.	Western Union Telegraph Co., October	1 36
	5.	American Express Co., October	6 05
	5.	National Express Co., October	6 00
Dec.	1.	Commercial Telephone Co., November	5 00
	1.	National Express Co., November	4 45
	1.	American Express Co., November	7 20
	1.	Baltimore and Ohio Telegraph Co., November	1 03
1885.			
Jan.	5.	Western Union Telegraph Co., December	1 42
	5.	Five Cent Express Co., November	2 00
	5.	National Express Co., December	9 40
	5.	American Express Co., December	5 95
	5.	Hudson River Telephone Co., December	5 00
Feb.	3.	Hudson River Telephone Co., January	5 20
	3.	Western Union Telegraph Co., January	1 90
	3.	American Express Co., January	5 35
	3.	National Express Co., January	3 70

1885.			
Feb.	5.	Bankers and Merchants' Telegraph Co., December	$0 33
Mar.	5.	Hudson River Telephone Co., December	5 20
	5.	Bankers and Merchants' Telegraph Co., February	25
	5.	Western Union Telegraph Co., February	2 38
	5.	American Express Co., February	2 50
	5.	National Express Co., February	4 35
	5.	Baltimore and Ohio Telegraph Co., February	78
April	2.	Hudson River Telephone Co., March	5 00
	2.	National Express Co., March	3 00
	2.	Western Union Telegraph Co., March	3 78
	2.	American Express Co., March	3 35
May	5.	American Express Co., April	2 45
	5.	National Express Co., April	3 15
	5.	Hudson River Telephone Co., April	5 10
	5.	Western Union Telegraph Co., April	6 19
June	4.	Western Union Telegraph Co., May	3 37
	4.	Hudson River Telephone Co., May	5 00
	4.	National Express Co., May	6 60
	4.	American Express Co., May	5 90
	19.	Baltimore & Ohio Telegraph Co., May	26
July	1.	American Express Co., June	2 10
	1.	Western Union Telegraph Co., June	10 36
	1.	Hudson River Telephone Co., June	5 25
	7.	National Express Co., June	3 55
Aug.	3.	Baltimore & Ohio Telegraph Co., June	37
	6.	Hudson River Telephone Co., July	5 00
	13.	Western Union Telegraph Co., July	8 55
	13.	American Express Co., July	4 35
Sept.	11.	Hudson River Telephone Co., August	5 00
	11.	Western Union Telegraph Co., August	10 06
	11.	National Express Co., August	9 20
	17.	American Express Co., August	6 15
	30.	Western Union Telegraph Co., September	5 20
	30.	Hudson River Telephone Co., September	5 25
	30.	American Express Co., September	1 50
	30.	National Express Co., September	3 55
			$220 19

PRINTING AND STATIONERY.

1884.			
Nov.	22.	Weed, Parsons & Co., printing	$250 05
	22.	Edwin Ellis & Co., stationery	5 65
	26.	Fergus Halpen, printing	4 75
Dec.	3.	Van Benthuysen & Co., printing	125 00
	10.	Fergus Halpen, printing	10 00

1885.			
Jan.	29.	Julius Bien & Co., lithography	$150 00
Feb.	18.	Julius Bien & Co., lithography	85 50
	27.	R. K. Quayle, engraving	8 00
Apr.	30.	R. K. Quayle, engraving	40 00
May	10.	Fergus Halpen, printing	2 50
	26.	Fergus Halpen, printing	10 00
June	7.	Van Benthuysen & Sons, printing	399 00
	7.	Van Benthuysen & Sons, printing	70 35
	12.	Weed, Parsons & Co., printing	654 11
	12.	Van Benthuysen & Sons, printing	554 50
	30.	Fergus Halpen, printing	3 75
July	3.	Fergus Halpen, printing	5 00
	21.	R. K. Quayle, printing	4 17
	23.	Van Benthuysen & Sons, printing	257 30
Sept.	25.	Weed, Parsons & Co., printing	289 24
	29.	Van Benthuysen & Sons, printing	144 50
			$3,073 37

LIBRARY.

1884.			
Nov.	3.	D. Appleton & Co	$4 00
	15.	Wm. Gould	19 50
Dec.	1.	Colton & Co	10 00
	5.	Putnam & Co	2 50
1885.			
Jan.	15.	Wm. Wood & Co	5 00
	15.	*The Sanitarian*, subscription to	4 00
Feb.	18.	J. Vail & Co	12 00
	18.	J. B. Beers	10 00
Mar.	10.	Wm. Gould	2 50
	14.	*Sanitary Engineer*, subscription to	4 00
Apr.	4.	Journal of Compr. Science	2 00
June	4.	A. S. Barnes	9 00
	19.	Sampson, Davenport & Co	3 00
July	11.	J. H. Vail	4 88
Aug.	21.	W. Eskermann	2 58
	21.	Ex. F. N. Spoon	1 00
			$95 96
		Geo. McDonald	8 00
			$103 96

PETTY CASH.

1884.			
Nov.	15.	Draper & Brown	$6 00
	22.	R. K. Quayle	5 00

1884		
Dec. 19.	Rent of P. O. box	$3 00
22.	James Groesbeck	16 80
22.	Eimer & Amend	45 76
1885.		
Jan. 29.	M. L. O'Brien	4 00
Mar. 10.	S. G. Spier	1 00
19.	Rent of P. O. box	3 00
Apr. 10.	Albany News Co	30
15.	James Groesbeck	3 50
17.	T. H. McAllister	2 75
June 14.	Edwin Ellis	75
July 11.	Frederick Carman	4 25
Sept. 25.	Rent of P. O. box	3 00
		$99 11

FURNITURE.

1884.		
Dec. 1.	Fairbanks	$6 00
1885.		
Jan. 22.	S. & P. Templeton, dusters	3 85
30.	Draper & Brown	9 00
Mar. 14.	W. B. Moore	12 00
16.	W. B. Moore	1 00
June 19.	D. Boughton	5 00
Aug. 13.	Van Heusen & Charles	4 00
Sept. 25.	Eimer & Amend	9 83
29.	Hammond, typewriter	100 00
29.	Michael & Co	4 32
		$155 00

REPORT OF THE SECRETARY.

REPORT OF THE SECRETARY.

Although the registration of Vital Statistics is yet far from complete, a gratifying increase in the number and character of the returns forwarded by local registrars is noticeable. Under the amended public health act of 1885, which became a law in June last, the duty of reporting births devolved upon the parents or custodians of the children born; that of securing the record of a marriage upon the groom,; while the responsibility for obtaining and presenting certificates of death was placed, where it properly belongs, upon the undertaker or person having charge of the burial. The former acts failed to specify upon whom these duties should fall, and nearly all the local boards of health, in their discretionary power to supervise and regulate the registration within their respective jurisdiction, had relied on physicians exclusively for returns of nativity and mortality. But apart from the doubtful legality of compelling medical practitioners to report family details for forensic purposes, it was evident, as was pointed out in the introduction to the fifth annual report of the Board, that "complete" records could not be obtained by this method. Among the poorer classes, a very large percentage of the births occurs without the attendance of a physician, perhaps under the ministration of some irresponsible and ignorant midwife, often without extrinsic aid of any sort; and even where physicians have fully complied with the requirements of the local sanitary authorities, it is probable that at least forty per centum of the births have escaped registration. Despite the thorough organization and comprehensive powers of the New York City Health Department, the recorded birth rate in the metropolis for many years has fallen far short of the death roll, demonstrating the insufficiency of the existing system of obtaining returns, and in scattered rural populations the difficulty in this respect is greater. Some time must, of course, elapse before the public will have become familiar

with the provisions of the new law, but although scarcely more than six months have passed since its enactment, already the proportionate number of birth certificates transmitted to the central bureau has much increased and is monthly increasing.

The alteration in the provisions for recording marriages was based partly upon the almost insuperable neglect or reluctance of many clergymen and magistrates to send formal certificates to the local registrars, and partly upon the fact that in this State neither a religious nor a civil ceremony is required to constitute lawful wedlock. In view of this anomalous condition of affairs, it is certain that some more or less transient alliances which would possibly be declared valid by the courts, but which in reality are merely cloaks for concubinage, will never be recorded; but when the purport of the law shall be generally understood, it is probable that all who honestly contemplate an enduring partnership will avail themselves of a system which places the legitimacy of their offspring beyond dispute.

In addition to the increased efficiency of previously existing registration, by dint of unremitting effort the number of local boards called into active operation has been much enlarged. But to maintain this machinery in motion, constant supervision is needed, for the reason that, except in our cities, the local boards are subject to frequent changes of their entire personnel. In villages the tenure of office is only one year; in townships the town clerk is usually the registrar, being a member of the board, ex-officio; and since, unfortunately, in many places political considerations prevent the reappointment or re-election of the person who has become familiar with his duties, we have each year a succession of new and inexperienced incumbents, to be indoctrinated in the technical details of their position. Save as regards this element of instability, the present act leaves little to be desired for the protection of public health, and for the perfection of our registration, if its provisions were intelligently and energetically carried into effect. To obviate to some extent the difficulties of local administration arising from such transitions, and to render unnecessary frequent special meetings of health boards in sparsely settled districts, a code of regulations was framed, with the approval of the Attorney-General, in conformity with the new law, and covering the general principles of sanitation, and suggested to the various local organizations as a model in lieu of the "Model Code" formerly issued by the State Board, but rendered inoperative through the repeal of the laws on which it was founded.

The courts having decided that members of local boards of health are State officers to whom under a general statute are delegated certain "police powers" of the Legislature, it was determined by the Civil Service Commission that the various local health officers were subject to the civil service rules, under the schedule which provides for either competitive or non-competitive examination, at the option of the appointing body, and as a result of this system it is hoped that greater efficiency and longer retention in office will be obtained.

In cities, the mayor has the nomination of the members of the board of health, who are confirmed by the common council; two for a term of one year; two for two years, and two for three years. In this way, the board becomes a continuous body, two new members being appointed each year; but after the first year each appointment is for a term of three years. No term, however, is specified for the health officer, who is appointed at the first organization of the board to be "health officer for such city," he therefore holds office during the pleasure of the board, or until his successor is appointed; *i. e.*, indefinitely.

In villages, the trustees are directed to appoint a board of health each year, although in case of their failure so to do, the existing board continues in valid operation. As in cities, the health officer is not appointed for any specified term, but is "health officer for such village." It is not therefore necessary for each annually chosen board to make a fresh appointment of a health officer, or even formally to renew the tenure of the existing incumbent.

In towns, the boards of health are composed of ex-officio members, with the exception of the citizen member; but although the term named is only one year, the varying tenures of the justices of the peace gives an element of continuity to the organization. Here again the health officer is appointed without limit of time, and holds his position until he is superseded.

It is thus evident that the law contemplates permanency in the position of the medical officer whose duties require special training, and whose efficiency will be increased by practical experience in sanitary administration. Indeed, it is obvious that the health officer must be the skilled adviser as well as the executive officer of his board, and that each new board must largely depend on him to guide it in its action, and to maintain the necessary continuity of operation.

Beyond the bare records of deaths from different diseases, it has

been impossible to tabulate data of real statistical value. To reach conclusions of sanitary importance it is necessary to compare the mortality at different ages with the number of persons living at such ages; to balance the deaths under one year of age by the number of births during the year; to separate sexes, occupations, races, social conditions, density of population, and sundry other factors which have an essential bearing on the lessons to be drawn from the death roll. But to sift out even a few of these requirements of tabulation from the multitude of death certificates monthly received at the central bureau would occupy a much larger clerical force than that at present employed, which is not adequate to the actual needs of mere registration of current events; and to fulfill all the conditions would demand a more complete system of returning births than is likely to be achieved for some time to come, and an accurate and elaborate census enumeration. It has, therefore, been impracticable to do more than to show the percentage of deaths from the various zymotic diseases, and the ratio of deaths under five years to the total mortality. In connection with this latter computation it should be remembered that although, other things being equal, the mortality of childhood is to a certain extent a criterion of the sanitary condition of a locality, yet there are several possible sources of fallacy in basing an opinion thereon, unless we know the relative proportion of children and adults in any given community. Among the more luxurious classes, where many domestics are employed in each household, the relative death rate of childhood will be less than in a perhaps more healthful district where prolific couples of smaller means do their own household work. Again, in some places, hospitals or asylums for persons in advanced life may introduce a confusing element by apparently showing an excesssive mortality from particular diseases, or, on the other hand, by counterbalancing the infantile death rate with a misleading preponderance of survivals to old age. Examples of such disturbing factors exist in the Soldiers' Home at Bath, Steuben county, which unduly increases the necrology of that township, and in the Sailors' Snug Harbor at New Brighton, Richmond county, of which the 800 inmates yield a large but extremely ripe harvest to the Grim Reaper. When, as in both these instances, the inmates become permanent residents, and even voters of the district, and are counted in the census as an integral part of its population, it is difficult to devise any practicable method by which the seeming unfairness to the locality can be rectified in statistical tables, since the

only basis for calculating the death ratio is, of course, the total number of inhabitants.

In many parts of the State one of the principal difficulties to be overcome in the interest of public health is the high level of the ground water, even apart from the wide regions of actual marsh land. It is needless to reiterate the lesson taught in this respect by the too great prevalence of malarial fevers which often assume an almost malignant type, or to repeat the teachings of universal experience in relation to the efficiency of sanitary engineering in diminishing and ultimately abolishing such fevers. Even where drainage has been undertaken solely for agricultural advantages, as in most parts of Great Britain, the incidental benefit to human health has become the most prominent result of the operation, and in regions formerly almost uninhabitable miasmatic ailments are now unknown. But these are not the only disorders attributable in part, at all events, to the same cause. The investigations of Bowditch and Buchanan long ago showed the close association of soil-saturation with pulmonary consumption, not, perhaps, as an immediate cause, but as unmistakably favoring the development and hastening the course of the disease ;* and when we see that from this one malady nearly a thousand deaths per month occur, or about fourteen per centum of the total mortality of the State, it may well be asked if legislative action be not justified and demanded. In but few instances can private enterprise suffice; conjoined action is needed to carry a drainage system to a proper outfall in the majority of cases, and one ignorant or unaccommodating landholder may thwart the desires and imperil the health of a community by refusing to co-operate or even to permit an outlet through his property. Sometimes a miasmatic region can only be relieved by obtaining an outlet through an adjoining township, or into another county; oftentimes the land is of too small value by reason of its very saturation, to bear the cost of

* Bowditch's conclusions were that: 1st. A residence in or near a damp soil, whether that dampness be inherent in the soil itself, or caused by percolation from adjacent ponds, rivers, meadows, marshes, or springy soils, is one of the principal causes of consumption in Massachusetts, probably in New England, and possibly in other portions of the globe. 2d. Consumption can be checked in its career and possibly, nay probably, prevented in some instances by attention to this law.

Buchanan's observations, from a different point of view, showed that the rate of diminution of phthisis corresponded with the depth of drainage, amounting to fifty per cent in the best drained districts.

Simon, commenting on these facts, declares that an undrained or damp state of soil answers the legal definition of a nuisance, and that sanitary authorities ought to be "bound to provide that such a state shall not continue through want of proper constructions for the drainage."

the remedy which, if applied, would enhance its worth four-fold by increasing its fertility. Indeed, this purely financial aspect of the question has caused the Act under which the English government has advanced funds for drainage, to be entitled one for the Improvement of Land; the rapid appreciation of the taxable value enabling both interest and principal to be repaid without hardship.

In still another class of examples soil-saturation is induced by artificial obstacles to natural drainage; either by miscalled municipal "improvements," obstructing water-courses or valleys worn by the water itself through centuries, and turning the yield of a wide shed into an insufficient channel; or by the triumphs of insanitary engineering which carry railways across land and water, bisecting hills and filling vales, regardless of creating swamps with their embankments, or of aught save making a level pathway for the iron steed.

The apparent influence of soil-saturation as one, at least, of the factors in the causation of Cerebro-spinal fever is shown in an interesting monograph by Dr. Meredith Clymer, published in 1872, when the disease first made its appearance as an epidemic in the city of New York, and illustrated by a map indicating the localities of the reported cases in relation to the topography of the city. This map demonstrates, as the author remarks, that "the chief nests of the epidemic were in those districts in which the original water-courses had been dammed by the filling up of streets and avenues, and over the adjoining water-saturated land. Most of the cases of the disease were grouped on and about the made land, originally marshes. One of the most striking examples is in Collect place, a swampy spot in the fourth ward. Basements over these marshy places are never dry, and the walls are often covered with cryptogams."

The association of this, as of several other zymoses, with dampness of soil had been noted by previous observers in this country and abroad; but it has never been so clearly pointed out as in the above-mentioned map, the original of which was prepared by Dr. Moreau Morris from the records of the New York Health Department. Soil moisture alone, however, is to be regarded only as affording favorable conditions for the development of other as yet unknown morbific agents, of which some of the products of decomposing organic matter are undoubtedly the most potent, and filth-contamination of the soil and ground water seems to be an essential element in the problem. As might have been expected, overcrowd-

ing and want of ventilation have frequently been associated with outbreaks of the malady, but these are rather to be viewed as intensifying the poison and lessening individual power of resistance, for, as Simon remarks, "In some cases, according to local reports, the distribution of an epidemic has very decidedly not been governed by conditions of overcrowding and ill-ventilation."* In the New York epidemic of 1872, Clymer observes that where the disorder occurred away from the marshy districts, "the elected haunts were densely populated tenement dwellings, in which the house drainage was invariably found in bad condition. The part played by the diffusion of foul sewer gases in favoring the development of the disease would seem, by the collected evidence, to be unquestionable," and he quotes from Dr. Morris's report that, "Wherever we have carefully examined the local conditions, it has been found that the drainage of the premises has been faulty, or that the immediate surroundings have presented such conditions as must necessarily give rise to some form of disease, — cellars containing decomposed or decomposing vegetables, garbage, or other filth, in a putrefactive condition, and privy vaults located beneath sleeping-rooms, windows in cul-de-sacs, where there were no free currents of air. The most usual defects discovered were connected with house drainage. These cases are not confined to the abodes of the dirty, squalid and poor, but houses of a better class, with brown stone fronts, have furnished their victims." In one of these latter, of which a description is given, the main waste pipe in its course through the cellar "had openings at the section joints and at the connections of the smaller waste-pipes from above; these fissures and openings had been hid and covered with a sort of soft cement, quite permeable and useless for its purpose. Underneath the kitchen-sink there had been such a leakage that the beams, together with the flooring over them, had rotted away, and emitted an odor like that from an old ice-box. This leakage had only been very recently repaired before the disease appeared in the house."

In the rural districts, when Cerebro-spinal fever occurs, it will usually be found that these two factors of filth-pollution and water-saturation of the soil coexist where the disease obtains an endemic foothold. There may be apparent exceptions to this rule, as where the malady has shown itself in elevated sandy situations. But in these domiciliary conditions of a similar character may commonly be discovered. Ziemssen [Cycl., vol. II, p. 695], says: "Poverty,

* Eighth Report of the Med. Officer of the Privy Council.

insufficient nourishment, and damp, overcrowded, badly ventilated, unclean ground floors * * * the overcrowding of dwelling and sleeping rooms, and the consequent loading of the air with animal emanations, perhaps also the saturation of the soil with garbage and the products of its decomposition, appear to be as powerful agents in the germination of the contagium as they are in that of cholera."

Despite the voluminous bibliography of the subject, we know very little of the ætiology or intimate pathology of this fatal disorder, which seems not to have been recognized before the present century, and of which the symptomatology is so capricious that, even in comparatively recent literature, according to Dr. N. S. Davis [Trans. Am. Med. Ass'n., 1866], "no less than three or four diseases have been confounded together." Farthermore, the difficulty of its study is increased by the circumstance that, unlike most of the specific zymoses, it affords no evidence of communicability or portability, but arises apparently spontaneously in the most isolated districts, often confining itself to single tenements or groups of houses, with no tendency to spread beyond them. Enough is known, however, to justify its classification among "filth diseases," and its greater prevalence during the colder months, when house warmth makes an indraught of the ground-air, strengthens the belief that its prevention is to be sought in proper drainage and purification of the soil, including, of course, the removal of all existing sources of pollution.

The deaths reported from this disease have ranged from twenty-five to fifty-three per month, distributed over the various districts of the State, and when it is considered that these deaths represent probably thrice as many cases, their significance becomes more ominous.

The prevalence of "filth diseases" as population becomes more dense emphasizes the need of adopting safer methods of refuse disposal than are now in use in the majority of our cities and villages. As far as sewage proper is concerned, where the topography of the locality permits and a fitting outfall can be obtained, the "separate system" of small pipe sewers with an adequate flushing supply affords an economical relief, although commonly with the drawback of contaminating streams into which the crude sewage is discharged, to the detriment of riparian communities below; and the cost of purification by irrigation or "downward intermittent filtration" is too great for its general introduction. But wherever water-carriage is employed, it is practicable to precipitate the suspended solids and

to render the effluent less noxious, at all events, if not quite harmless. In many places the method of "dry removal" might be advantageously and at small expense substituted for the present vile practice of polluting soil, water, and air by storing putrescent excrement in porous privy pits in close proximity to habitations and sources of water supply.

The beneficial effects of local sanitary organization in even partially awakening public attention to dangers of this kind are already manifesting themselves in a gradual reduction in the mortality from the diseases which bear the closest relation to contamination of drinking water, namely, typhoid fever and diarrhœal disorders. The following table, comparing the ratio of deaths from the principal zymotic maladies to the total deaths from all causes in 1884 and 1885, as far as shown by the returns to the Bureau of Vital Statistics, affords some suggestive evidence in this respect:

Rate per 1,000 deaths from all causes.

	1884.	1885.
Typhoid fever	15.33	13.27
Diarrhœa	131.07	90.80
Conjoined rate of Typhoid and Diarrhœa	146.40	104.07
Measles	14.02	14.55
Scarlatina	13.02	14.72
Whooping Cough	14.14	10.37
Diphtheria and Croup	47.65	56.06
Small Pox	———	0.41

It is noticeable that while there has been a decrease in the Typhoid and Diarrhœa rate, the relative morality from Diphtheria has shown an increase, its greatest fatality occurring in the colder months. Apart from any question of contagion, the propagation, if not the origin of this disease, is probably in the majority of cases largely dependent upon filth-factors of an intra-domiciliary character — faults of construction, house drainage, plumbing, etc.— which are in but small degree affected by public sanitary improvements or amenable to the efforts of local boards of health. Something may be done by compelling the removal of gross accumulations of putrescent refuse from premises, but until each individual householder is taught to care for the sanitary condition of his home in every respect, and to appreciate the truth of the homely adage, "an ounce of prevention is worth a pound of cure," we cannot hope for the extinction of a pestilence which is destroying nearly four thousand young lives per

annum. With strange inconsistency, a single death from that rarest of all diseases, Hydrophobia, will set a whole community agog, and arouse an insensate crusade of extermination against healthy dogs at any cost, while the very people who are foremost in such prophylactic panic apathetically close their eyes to the many thousands of deaths occurring annually from easily preventable maladies, and grudge the smallest outlay to avert losses far greater than the most disastrous war would inflict. At the lowest estimate of the pecuniary value to the community of a human life, Billings calculated from the census returns of 1870, "that the direct pecuniary loss to this country on account of preventable sickness and mortality is certainly over $100,000,000 annually, and this, without taking into account expenditures incurred on account of sickness,* etc., or the unusual losses due to great epidemics, both from waste of life and injury to commerce." (Introduction to Buck's Hygiene.) In this State alone, a similar computation will show that a saving of at least $10,000,000 annually might reasonably be hoped for from sanitary improvements; a gain which, at six per cent, would compensate for a capital investment of over $165,000,000. But to realize this gain, the probable causes of disease must be dealt with before the effects are manifested; to quote Billings again, "Sanitary measures, to be effective, should be carried out at those times when most people see no special cause for anxiety, and often, therefore, appear to involve unnecessary worry and expense." It is this unsentimental and purely monetary aspect of the question which must be impressed upon legislators and the public at large before preventive medicine can obtain the recognized place which it deserves as one of the most important objects of government; it must be generally learned that human health and productive industry bear a direct relation to the public treasury; that, as Farr has said, "Like capital invested in the soil, in the vintage, or in a commercial adventure, the capital invested in the life of man returns, in happy natures, profit of a hundred fold; in other cases, fifty, twenty, ten fold; in others it is barely returned; in some it is entirely lost, either by death, sickness, vice, idleness or misfortune."

Beside excremental and liquid wastes, a question of moment arises in all populous settlements in relation to the disposition to be made of garbage and other solid matters which cannot be admitted to sewers. In too many instances this problem is allowed to solve

* It is computed that each death in a community represents two years of illness in the aggregate; or, to state it differently, for each person who dies two are constantly ill.

itself by simply letting such substances accumulate in situ on the premises in which they originate, or in the streets and alleys adjacent, until complete decomposition carries off the effluvia, and a few of the inhabitants with them. In somewhat more civilized corporations it is customary to make a contract for the collection by carts of these residua, which are deported to a dumping ground on the outskirts of the municipality, where they create a concentrated nuisance. Fortunate are the localities where a large proportion of the filling in of sunken land for prospective speculative building sites is not composed of material of this sort. It is neither difficult nor expensive to get rid of all this organic refuse by burning it, and in many places abroad furnaces for this purpose, of different capacities, are used, which will consume house garbage, slaughter-house offal, street sweepings, and rubbish of every kind, with an inconsiderable outlay for construction and management. The adoption of this plan in our larger cities might perhaps deprive some of the malodorous industries in the bone-boiling and fertiliser line of a portion of their raw material; but it would undoubtedly mitigate the complaints of the dwellers within olfactory distance of Newtown creek and Barren Island.

Early in June, small-pox threatened to assume epidemic proportions in Montreal, where, owing to the opposition of the French Canadian population to vaccination, an immense unprotected field was open to its ravages. The danger from this source, in view of the constant intercommunication at many points along our extended border, was fully realized; but the State Board was without means to put skilled inspectors on guard to exclude infection by all the various channels of importation. Fortunately, the new Public Health Act, passed last winter, makes definite provision for the exercise by the local boards of health of "proper and vigilant medical inspection and control of all persons and things arriving from infected places, or which, for any cause, are liable to communicate contagion," and farther ordains that every such board shall "at all times provide thorough and safe vaccination for all persons within its jurisdiction who may need the same." Moreover, the local sanitary authorities are required to take "definite proceedings upon matters concerning which the State Board of Health, or its President and Secretary, shall be satisfied that the action recommended by them is necessary for the public good, and is within the jurisdiction of such board of health." Advantage was taken of these provisions to call into active operation, as far as possible, all the city, vil-

lage, and town boards upon the frontier and the main routes of travel, and an official circular was immediately sent to them, announcing the impending danger and urging prompt measures to secure efficient vaccination, especially of children in the public schools and persons employed about railway stations, boat-landings, and other places of passenger or freight traffic. This was followed by other circulars of instruction and advice as the varying exigencies of the case required, and, in addition, throughout the summer and autumn, continual private correspondence was maintained with numerous local boards and health officers in response to inquiries touching particular details of their duties and powers. A difficulty at once arose in obtaining vaccine virus in sufficient quantity to meet the emergency. Although the law prescribes that all expenses incurred by the several boards of health shall be a charge upon their respective cities, villages, and towns, in most of the villages and in all towns the boards are without funds for cash expenditures, and their payments must be deferred until the items are audited and included in a subsequent tax-levy. On the other hand, private dealers in vaccine are not willing to submit to the delay and uncertainty of this method of procedure, but usually demand immediate payment. This obstacle was surmounted through the aid of Dr. J. B. Taylor, in charge of the vaccine service of the New York City Health Department, who kindly made arrangements to supply all orders from local boards of health at the lowest possible cost and "on credit." In this way, and with the energetic co-operation of the boards of health in the most exposed positions, protection has been afforded to the people, not only of the localities chiefly concerned, but of the State at large, which, without this precaution, would in all human probability have suffered from an extensive diffusion of infection.

Happily, among our resident population there is seldom found any reluctance to accept the protection afforded by Jenner's great discovery, and if argument were needed at the present day to prove the efficacy of this protection, it could be forcibly drawn from the fact that, although at different intervals since March, twelve cases of small-pox have been reported to the State Board from localities where under ordinary circumstances, the contagion would have been almost certain to spread widely, in only two instances outside of the cities excepted from the operation of the general act, has there been any extension reported beyond the initial focus, one of these being in the person of a nurse, who, supposing herself immune

through a long past attack of variola, was not revaccinated, and contracted varioloid from the patient on whom she was attending.* In frightful contrast to such fortunate results, the epidemic was raging in Montreal and its environs among the unvaccinated, with alarming mortality, inflicting incalculable damage upon commerce and industry and leaving hundreds of hearth stones desolate. But even there it fell lightly on those who had been primarily vaccinated in infancy, and as far as is known spared altogether those who had been properly revaccinated. In face of facts like these and thousands of similar portent, which are familiar to all who have cared to learn, the fanatics who seek to excite ignorant animosity against the great-

* Note — On the 3d of March, it was reported that a railway flagman of the West Shore line was at a lodging-house at Coeymans Junction, with suspicious symptoms, and Dr. F. C. Curtis visited the place to take such action as might seem necessary. On his arrival, however, it was found that the patient, though feeling unwell, had gone on with his train to Syracuse. The account given of the case warranting a belief that he was suffering from the preliminary fever of variola, the persons who had been exposed to contact with him were vaccinated and kept under observation until the period of incubation was past. Notice of the probable danger was sent to Syracuse, where, on March 7th, the nature of the disease was declared. The city board of health promptly isolated the case, vaccinated the persons who had been in any way exposed to infection, and quarantined those who had actually held intercourse with the patient. Of these latter, two were subsequently attacked; one of them with a mild form of varioloid, thirteen days after successful vaccination, the other, who had probably contracted the malady at Coeymans Junction, but who had escaped vaccination, with unmodified variola which proved fatal. No extension from these foci occurred.

The supposed origin of this outbreak is traceable to a lady who had arrived from Germany in the steamship *India*, February 6, and soon afterward started for Chicago in a sleeping car on the West Shore road. She complained of feeling ill during the journey, and on reaching Chicago was found to be suffering with small-pox. The car was fumigated and the bedding in the section occupied by her was burned; but apparently the process was insufficient, for when the car was returned to the road, on the 19th, it was placed in charge of the flagman whose seizure on March 3, just twelve days afterward, points to it as the probable vehicle of infection.

It has been attempted to connect the beginning of the Montreal epidemic with this episode, on the ground that two conductors were transferred from the train at Chicago to a Canadian line, and it is asserted that the first case of small-pox was discovered in Montreal on the 28th of February. But while it is impossible to disprove the assertion, the fact, stated by Dr. Covernton at the conference of State Boards of Health, in December, 1884, that the disease was then prevailing in Ontario, renders it at all events possible that the importation may have had its origin from that Province, through fomites if not infected persons.

It is worthy of notice that although no disease was reported to have occurred on board the *India* during the voyage, with the exception of a fatal case of pneumonia, the captain shortly after her arrival in port was discovered to have an eruption which was diagnosed as "chicken-pox." As the vessel sailed from Hamburg, January 15, the duration of the voyage was too long to admit the supposition that the disorder had been contracted before departure, and it is likely that some infected luggage, opened about midway across the ocean, was the immediate source of contagion.

Another importation from abroad occurred in the person of a child in a Polish family which arrived in New York from Bremen on the 10th of May, and started at once for Buffalo, in which city the patient was dicovered on May 23, the disease being at about the

est boon ever conferred by science on humanity cease to hold a claim on our pity for their folly, and deserve to be regarded as public enemies.

Another lesson to be derived from our frontier experience relates to the futility of relying on quarantine alone to exclude contagious disease. In all the cases reported, the malady did not declare itself until several days after the arrival of the patients, who had crossed our boundary during the incubative stage of the infection, showing at the time no signs of illness, but having, perhaps, been unconsciously and casually exposed to the contagium during their journey in railway cars or other public vehicles. If altruistic sanitary

seventh day of its course. Here, again, the infection was evidently acquired during the passage, and not at the port of departure, and the patient landed unsuspected on our shores while the malady was incubating. This case gave rise to much apprehension in Buffalo, as the family had found quarters in a crowded district, inhabited principally by Poles of the lowest class. Immediate steps were taken, however, by Dr. Briggs, the health officer of the city, to secure isolation and disinfection, and all unprotected persons in the vicinity were promptly vaccinated. Thanks to these precautions, no spread of the contagion took place.

On June 16, one case of small-pox was reported at Plattsburgh, the first invasion from Canada.

Early in July the disease showed itself in Long Island City, but, owing to the chaotic condition of the local board of health, it was not reported to the State Board, and there are no means of knowing how many cases occurred. On the 9th of the same month, two cases were found at East New York, the origin of which it was impossible to trace, and on the 18th, another case occurred in the same family. No extension to adjoining households happened.

September 21. One case at Little Falls; no spread of the infection.

October 21. The captain of a canal boat arriving at Rouse's Point from Canada, was found to be suffering from small-pox. The boat was quarantined half a mile from shore, and no further cases were reported.

On the 10th of October, a lady with her two children came from Montreal to visit her father in the town of Mooers, Clinton county. By the order of the local board of health, she returned on the following Monday to Canada, but left the children with their grandfather. On the 22d, one of these children was found to have small-pox, and in about twelve days afterward the second one and also another member of the family sickened. The house was quarantined and placarded, and after the recovery of the patients disinfection was practiced by the health officer; but it is suspected that during the illness an eccentric neighbor, who dabbled in diagnosis on the strength of his maritime experience, entered the premises "to find out whether it was small-pox or not." At all events, on the 5th of November, this inquisitive neighbor's son was reported to the health officer as having variola, and the latter gentleman confirmed the diagnosis, despite the indignant dissent of the father. This case is not positively traced to infection from the first mentioned household, and may have had a different origin, as the locality is on a direct line of travel from Canada.

October 24. A new inmate of the Essex county poor-house displayed the eruption of variola. The patient was isolated, all persons who had been exposed were vaccinated, and a nurse who, having had the disease, was supposed to be protected, was engaged. On the 11th of November, this nurse sickened with varioloid.

December 4. A case reported from Quarryville, near the village of Saugerties, the eruption having declared itself five days previously The infection was probably contracted in Albany, as described in the following letter from Dr. Kemble, health officer of Saugerties:

efforts could everywhere be directed to isolating communicable disease at its place of origin and preventing its exportation, quarantine might merit the confidence reposed in it by some continental authorities; but it can never be completely efficacious to guard against importation, and the most important function of preventive medicine is to endeavor to diminish individual susceptibility to infection; to remove, as far as possible, all conditions which may favor the multiplication and dissemination of the poison.

When the Provincial Board of Health assumed control of traffic and travel from Montreal, under the capable superintendence of Dr. Covernton, every available step was taken to prevent the exit

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To the Secretary of the State Board of Health:

SIR — I have the honor to make the following report of case of varioloid in this town:

James Stone, a resident of this town, while at work on capitol at Albany, was taken sick November 23, 1885 (Monday), and on Wednesday came home to spend Thanksgiving, when he took to his bed, and a physician was sent for. On Saturday the 28th, the doctor noticed an eruption, and told me his suspicions in the case, and said he would report at his next visit in the morning. Sunday 29, he pronounced it a case of varioloid. The man lived three and a-half miles from the village of Saugerties, in a one and a-half-story frame house, along a country road — a couple of hundred yards from other houses. I went at once and placed them in quarantine.

The family consisted of father, mother, and four children; the latter under ten years of age, two of which had never been vaccinated. The whole family were at once vaccinated. Quite a number of people had been in on Thursday and Friday, but no one after, to my knowledge. The man could give no clue to source of contagion; said he had been to the *theatre* and to *church* (he was a Catholic).

Everything was promptly removed from his bed-room, and the children directed to be kept up stairs, as much as possible; there was but one room besides his bed-room down stairs. A guard was placed outside to do errands, etc., and nothing permitted to pass out of the house, not even a postage stamp. On Thursday, the sixth day since the doctor noticed the eruption, he was flighty at night and also Friday. Saturday evening when I called at the door, his wife said he was better, he rested better that night, but toward morning had a chill and soon after died. That evening he was put into a coffin and box and his bedding was taken some distance from the house and with a favorable wind *burned*. His body was then brought to the Catholic cemetery in this village and buried in a deep grave at midnight. The widow and her four children were kept in quarantine until fourteen days had elapsed, after his first breaking out, then the living rooms were thoroughly disinfected (the bed-room having previously been), and the quarantine declared raised.

The vaccinations all took, and up to date, there has been no further development of disease. His disease was of confluent variety; very profuse over head and upon extremities. There has been a pretty thorough vaccination in the town, and the people may well be thankful, that owing to prompt action of board of health, there has been no further spread of the disease. I am very respectfully,

Your obedient servant,

WARREN KEMBLE,

Health Officer,

Saugerties, N. Y.

December 18, 1885.

A fatal case, which by an oversight was not reported to the State Board at the time of its occurrence, happened at Kinderhook. On the 24th of December, a lady residing in Albany went thither to visit her mother, whose family consisted of eight persons, including two unvaccinated children. On the 26th, she first complained of feeling ill, and on the 28th the eruption appeared, becoming confluent, and death ensued on the 31st. Dr. Pruyn, health officer of Kinderhook, secured prompt vaccination of all the inmates of the household, and proper isolation and disinfection, and it is hoped that no farther danger is to be apprehended.

[Since the above paragraph was written, Dr. Pruyn has reported, under date of January 10, that all vaccinations proved successful, and that no other cases haven arisen.]

The exposure in this instance is supposed to have occurred through intercourse with a teamster employed at the Albany alms-house, who is alleged to have been engaged in the pest-house belonging to that institution, and who, according to the patient's own statement, had visited her house.

of infected articles, or of persons who could not show evidence of protective vaccination; and the beneficial effect of such action has been demonstrated in the comparative exemption of Ontario from invasion and the ease with which the disease has been "stamped out" in the few places where it has occurred. But though the exodus by public means of conveyance was thus regulated, there still remained too many risks of private access to this State to permit any relaxation of vigilance on the part of the local boards of health. The shores of Lake Ontario and the St. Lawrence river offer innumerable landing places for small boats, while more than sixty miles of our boundary consist of an imaginary land line, crossed by roads and pathways open to the casual wayfarer. Even had it been possible for health boards in the border towns, with their limited resources, to watch every point of entry, their jurisdiction does not extend beyond their corporate bounds, and they could have no control over suspected persons or things until their territory had actually been invaded. Early in October the Governor of New York appealed to the United States Treasury Department for aid from the "epidemic fund" appropriated by Congress, and in compliance with his request the Marine Hospital Service organized a system of inspection under the supervision of Surgeon Austin, agents being stationed at the principal boat landings and at all the entries of railways, with instructions to examine approaching trains and prohibit the ingress of passengers and luggage without a satisfactory medical certificate of freedom from infection. This system, however, was designed only to protect the frontier line, and not in any wise to trench upon the jurisdiction of the local boards of health, or to relieve them from responsibility in respect of sanitary administration within their respective municipalities.

The cost of vaccine, even at the lowest rates, is a serious tax upon many of the smaller communities, and, since the whole State is concerned in having every locality rendered invulnerable to epidemic disease which may thence spread to adjoining populations, it appears only equitable that aid should be extended to the local boards in furnishing the virus which they are expected to apply gratuitously. At comparatively small expense, the State Board could make arrangements, either on its own account, or by contributing to enlarge the facilities of the New York City Vaccine Department, to provide reliable virus at all times in sufficient quantity for such gratuitous use.

The deaths from small-pox during the past year were: In April,

one in Syracuse; in June, three in the city of New York; in July, two in New York, one in Long Island City, one in East New York; in September, five in New York; in October, three in New York, one in Albany, one in Essex county poor-house; in November, eight in New York; in December, five in New York, one in Quarryville, one in Kinderhook.

Typhus fever, which had for some time held no place in our mortality records, showed itself early in the year in New York city and Brooklyn, and up to the end of November fourteen deaths had occurred from this disease in these two cities, twelve of them being in the former; no cases having been reported in any other locality in the State. In the latter part of November, however, an outbreak took place in the Albany penitentiary, which at one time threatened to assume dangerous proportions. The contagium was doubtless introduced by some recent convict, the sanitary condition of the prison being good, and the inmates who had been long confined having been previously free from disease; but as the nature of the malady was not recognized until many persons were affected, the origin of the first case could not be ascertained. As soon as the City Board of Health was informed of the existence of the disease, active measures were taken to prevent its spread, and it is now believed to be under control. The observations of the local board in the present epidemic have seemed to fix the maximum incubation period of the infection at two weeks from the known dates of exposure, and have, as might be expected, indicated that the malady manifests no great extent of contagiousness under favorable conditions of cubic space, ventilation, and cleanliness.

At the beginning of the year apprehension was entertained of the probable importation of Asiatic Cholera, which had committed disastrous ravages in the south of France during the preceding season. Happily, this country was spared a visitation of the pestilence, although, as was anticipated, it again spread in the Mediterranean districts, causing in Spain and Italy alone, up to the middle of October, over 100,000 deaths, and showing itself in less portentous proportions in France, China and Japan. Its continuance in scattered cases in the Mediterranean provinces during the past winter gives warning that the warmer weather may induce a renewed outbreak, and that our domestic precautions to abate all conditions which might afford it a lodgment should be energetically maintained.

POTABLE WATER.

The question presented to the sanitarian in connection with water pollution is not whether a given specimen of water is certain, or even likely, to cause immediate disease among its consumers; but whether it affords conditions which may, under possible future contingencies, originate or propagate zymotic disorders. And this is a question which, in the present state of our knowledge, neither chemical nor biological processes can satisfactorily determine. Nearly all modern chemists of any eminence are agreed as to the inadequacy of analytical methods to pronounce upon the wholesomeness of water, howsoever useful they may be in measuring its chemical purity. Nichols remarks that "it is not only difficult but impossible, either to determine the total amount of organic matter, or to decide upon its origin. As far as the total amount is concerned, the fact that it cannot be determined is a matter of no great consequence. Even if the chemist could say with certainty that a particular water contained exactly one or two or five parts organic matter in 100,000, we should be far from having the data necessary to form an opinion as to the wholesomeness of the water, for it is evident to any one that a pound of sugar or of glycerine would have a very different importance from that of a pound of (dry) fœces, yet either is a pound of organic matter." A cup of coffee or tea contains more organic matter than a dangerously polluted water, and a weak solution of quinine will yield enough organic carbon and nitrogen to condemn a water by Frankland's process if the source of the admixture were unknown. Mallet, after an elaborate comparison of the various methods in use, separately and collectively, while he attaches much importance to a determination of nitrates and nitrites, concludes that, "it is not possible to decide absolutely upon the wholesomeness or unwholesomeness of a drinking water by the mere use of any of the processes examined for the estimation of organic matter, or its constituents;" that such processes "should even be deemed of secondary importance in weighing the reasons for accepting or rejecting a water not manifestly unfit for drinking on other grounds;" and that "there are no sound grounds on which to establish such general 'standards of purity' as have been proposed, looking to exact amounts of organic carbon or nitrogen, 'albuminoid ammonia,' oxygen of permanganate consumed, etc., as permissible or not. Distinctions drawn by the application of such standards are arbitrary, and may be misleading." On the other hand, Wanklyn, who is the originator and enthusiastic upholder of the "albuminoid ammonia"

test, proclaims that "presence or abundance of nitrates does not show defilement by means of sewage, and deficiency of nitrates does not show absence of defilement, * * * and it cannot too strongly be insisted upon that the nitrates afford no data of any value in judging of the organic quality of a water." Indeed, anyone who is conversant with the numerous controversies between Tidy, Frankland, Wanklyn, and others will be inclined to agree with Folkard in his assertion that "eminent water analysts had brought forward apparently conclusive evidence of the worthlessness of all processes of water analysis except their own, and he was convinced that each one of these chemists was right." Such an assertion is, of course, not intended to cast discredit upon the skill of the chemist or the accuracy of his quantitative results; the essential point at issue from a sanitary outlook lies in the interpretation of these results. What may be "impurities" in the eye of the technical chemist (such as carbonate of lime or other mineral matters), may be of very trifling hygienic import, whilst a water that would be passed as reasonably pure by the most exacting analyst may convey disease. Thudichum has said that there may be waters "perfectly clear and palatable, in which the chemist would discover no appreciable amount of organic matter, and yet they would carry death wherever they were consumed." Ekin has stated that he had "over and over again, examined water that had undoubtedly given rise to typhoid fever, and found that it contained a very small amount of organic matter, and he had gone into districts where there could be no sort of contamination, and examined the springs, rivers and brooks, in which he had frequently found large amounts of organic matter that by no test could be distinguished from the organic matter in sewage." Huxley is reported as declaring that "water might be as pure as possible from a chemist's point of view, and yet be most deadly." Frankland says: "I have myself mixed one volume of the dejection of a patient dying of cholera with 1,000 volumes of good water, and have submitted it to analysis, and have been unable to detect any thing unusual in the water; chemical analysis is unable to detect these small quantities of morbific matter which are calculated to transmit disease to people drinking the water." De Chaumont gives, in his lectures on State Medicine, tables of analyzed waters, showing that "in several cases with a small amount of albuminoid ammonia specific disease was present, whilst in others with a much larger amount no disease was traced," and on another page he remarks that "an increase in such substances as nitric and nitrous acids and ammonia is only evi-

dence of previous contamination of a dangerous kind, but no proofs by themselves of existing danger." In fact, nitrogen as nitrates and nitrites is found in almost infinitesimal quantities in fresh sewage, these being the products of destructive oxidation, usually in the soil, and not necessarily derived from sewage, as nitrates may be furnished in large amounts by certain geological strata, notably in the case of chalk, or even by the air to falling rain. Farthermore, as was shown by the Report of the Rivers Pollution Commission, "nitrates and nitrites are also rapidly destroyed when the organic matter in the water containing them enters into putrefaction, a condition which often occurs in streams or reservoirs containing much polluting organic matter." It was Frankland who first dwelt upon the importance of this estimation of what he christened "previous sewage contamination;" but his indefatigable opponent, Wanklyn, retorts that "the only object worth keeping in view is the present or actual impurity, and that the search for past contamination is a confession of the untrustworthiness of the test for actual contamination." The latter chemist, as has already been noted, lays almost exclusive stress on the quantitative determination of albuminoid ammonia, so called because albumen is one of the principal substances which yield ammonia on distillation with an alkaline solution of permanganate of potash; on this process, however, Frankland has visited the severest retaliatory criticism, and Nichols, while admitting its value in certain respects, observes that, "because different amounts" (of albuminoid ammonia) "are obtained from the same weight of different nitrogenous substances, as well as on account of the fact already alluded to, that the oxidation of different substances by the permanganate of potash is more or less incomplete, the figures obtained have a relative rather than an absolute significance."

The now almost entirely abandoned estimation of "organic and volatile matter" by ignition, and the various processes for ascertaining the "total oxygen absorbed" by organic matter from a permanganate solution, have had their advocates and their opponents; chlorides, though always present in sewage, may come from many other sources and their amount is by all analysts considered only in connection with other data, many waters having induced disease where but a very small percentage of chlorides was present, and many innocuous waters containing quite large amounts. In fine, although nearly all the proposed tests may suffice to cast suspicion upon a water, yet, since they show products rather than processes of decomposition — indicating the presence of substances possibly adapted to

injurious fermentative action, but not the ferments themselves — all candid investigators concede their insufficiency to decide the question of safety or danger. To take a positive stand in this respect is to risk the ludicrous inconsistency quoted by Fox, where the water of the same well being analyzed by five chemists of repute, the first opines "that the water is of good quality;" the second, that "it is surface water, and is bad;" the third, that it contains "so much organic matter as to be unfit for drinking;" the fourth, that it is "a perfectly pure water, and quite fit for all domestic purposes;" the fifth, that "the water is unusually pure." It is but fair to add that some of these opinions were from gentlemen who classed harmless mineral substances as "impurities."

In the report of a committee, of which Prof. C. F. Chandler was chairman, to the State Board of Health in 1882, the status of chemistry in its relations to hygiene is admirably summarized by Waller, who frankly admits that, "In reviewing the methods of water analysis for sanitary purposes, and the conclusions to be drawn from the results, we cannot but conclude that our knowledge of the whole matter falls very far short of what is desirable. * * * At the present time, the utmost that we can do is to endeavor to discover whether a given water affords favorable conditions for the growth of dangerous germs, assuming that hypothesis to be correct. The processes of putrefaction, especially those of animal matters, are most likely to afford organisms dangerous to the human system, therefore, though some dangers are to be apprehended from decaying vegetable matter, the dangers from the presence of sewage in a water are much greater. If, then, we could detect even the minutest traces of sewage in a water, it would serve as a basis for pronouncing a decision upon it. But here again we are at fault, since, so far as known, there is no element or principle existing in sewage and characteristic of it, which would survive the percolation through a few feet of soil, that does not exist in waters of undoubted purity." And of the attempt to define fixed standards of purity, he adds that, "by this means we may condemn many good waters as bad, and what is worse, pass many bad waters as good."

The appended table will show some of the standards of purity adopted by different chemists, and indicate how far a few analyses of water compare therewith. It is, however, hardly necessary to adduce farther argument in support of the self-evident proposition that an undetectable admixture of the specific poison of cholera or typhoid fever is more to be feared than a vastly greater contami-

nation with the products of decomposition of non-specific matter. It is a thing of common experience that water highly contaminated with even excremental matter may be drunk for a long time with apparent impunity by many people; but that at some unexpected moment, either from an as yet unknown change in the fermentation-process, or as is oftener probable, from the introduction of an almost inappreciable quantity of specific infective excreta, an outbreak of typhoid fever may devastate the community thus supplied. The disastrous epidemic at Plymouth, in Pennsylvania, last year, affords, according to the recorded phenomena, an illustration of this difference between quantity and quality of pollution, the disease seeming to have selected the consumers of the water from a reservoir contaminated by the discharges from a single typhoid fever patient, and spared those who used that from wells containing much more organic matter as indicated by chemical tests. A still more striking example was that at Caterham, in England, where the evacuations from a temporarily employed laborer with "walking typhoid" found access to a large well sunk in the chalk for public supply, and sufficed to distribute the malady extensively along the water-mains. Scores of similar instances, as regards the dissemination of both typhoid and cholera by extremely minute volumes of infective material abound throughout sanitary literature. There appears to be increasing evidence in support of the belief, as old as the days of Hippocrates, that malaria may be conveyed by water. Within recent years, several observations, principally in India, have shown the association of malarial fevers in otherwise exempt localities with the use of water from streams flowing through marshes and jungles some distance away, and it is pointed out that the most dangerous streams are those which rise in the dense forest and are overhung in part of their course by thick foliage and underbrush, while those which are bordered by sand and boulders are generally innocuous. (British Medical Journal, No. 1245, p. 942.) It is, of course, obvious that in the existing state of chemical science no analytical process could detect this sort of morbific contamination, nor is such an achievement possible until, if ever, pathology shall have determined the precise nature of the various contagia. There is, perhaps, some reason to suspect that these may ultimately come to be classed among chemical products of fermentation in which the various micro-organisms now generally regarded as specific play the part of ferments, their reaction on their environment evolving, as a tertium quid, the real materies morbi; a something to be classed, perhaps,

among the as yet little studied group of the ptomaines. Pasteur's experiments in "attenuating" the virulence of certain "microbes" by successive cultures in comparatively simple media until ultimately they become quite innocuous, and, per contra, the apparent intensification of the "micrococcus septicus" by successive transmissions through animals, point to this essential influence of the environment, if not to the possibility that the medium may be more concerned in the character of the product than the particular kind of microzyme. The fact that different observers have insisted on their discovery of different micro-organisms as the specific causes of one and the same disease, as in the cases of typhoid fever and cholera, lends some weight to the arguments of the polymorphists who like Naegeli, believe that the pathogenous bacteria are "nutrimental" modifications of the non-pathogenous varieties, and that any of the schizomycetes may manifest itself "as the agent of acidification of milk, of putrefaction, and as the agent producing several maladies." Hueter, at the International Congress of 1881, announced his belief in the possibility, "that at any spot the putrefactive processes may take on such a course that micro-organisms arise from them which produce scarlatina." It is well known that various fungi may act like torula in producing alcoholic fermentation, and that the torula itself may, in alternate generations, give rise to alcoholic or acetous fermentation. Ziegler, in his Pathological Anatomy, remarks: "It does not, however, follow that each kind of decomposition is due to a single specific fungus, nor that one fungus may not give rise to more than one kind of decomposition." And further on he says: "It is possible that harmless colonies of bacteria may become dangerous if they are removed from their normal seat to other regions. Thus the saliva, when it contains bacteria, may excite violent inflammation if it reaches the bronchi or alveoli of the lungs;" and again, "though we may partake with impunity of many fermenting or decaying substances as food, we must not think that all the products generated by the non-pathogenous are equally harmless. Highly poisonous substances are formed in many of the bacterial decompositions. One of the most speedily fatal of diseases, septicaemia, is due to poisoning of the system with the products of bacterial putrefaction, or sepsis. Cadaveric poison, the poison of decaying fish, sausage, cheese, mussels, etc., are very probably the chemical products of special forms of putrefaction." On another page he reminds the reader that "it is bacteria which superinduce putrid decomposition in albuminoid

bodies. * * * When albuminoids undergo putrid decomposition, we have formed peptones and similar bodies; a certain putrid principle or poison (Panum), and bodies resembling ferments; sepsin (Bergmann and Schmiedeberg), nitrogenous bases, like leucin and tyrosin," etc., etc.; and in this connection it is to be borne in mind that the most potent agent of ordinary putrefaction is the non-pathogenic bacterium termo. Sir James Paget, in the Bradshawe lecture of 1882, after referring more particularly to individual susceptibility as affording the soil for the multiplication of disease-germs, remarks that, "even among those in whom they do germinate, the product varies according to the soil." In the preceding year Dr. Harley's experiments had led him to affirm that, "a fungus which may have no toxic properties when grown on one soil, may acquire toxic properties sufficient to be deleterious to animal life when grown in another." The idea thus shadowed forth, of modification by the environment, is ingeniously supported by Dr. Millican in his interesting work on "The Evolution of Morbid Germs" (London, 1883). Simon, in his article on Contagion in Quain's Dictionary, adverts to the "analogy in the facts which Professor Mosler has put together in explanation of the blue milk contagium of dairies; facts showing that the omnipresent penicillium glaucum, if its spores happen to light in particular (morbid) sorts of milk, will operate distinctively on their casein as an anilin-making ferment, rendering the milk blue and poisonous, and imparting to each drop of it the power to infect with a like zymosis any normal milk to which it may be added;" and he continues, "in our own more special field, pathologists have already learned that certain of the so-called "morbid poisons"— the contagia of erysipelas, pyæmia, and tuberculosis, are intimately related to the common ferment or ferments of *putrefaction;* and that the most vehement of these contagia can be developed by the artificial culture of successive transmissions in the living body from the comparatively mild contagium of any *common inflammatory* process." The most recent contribution to the chemical side of this vexed question is that of Professor Brieger, who, in a monograph (*Die Ptomaine*, Berlin, 1885) describes and formulates eight alkaloidal products of putrefaction, including a definite, extremely toxic, and apparently specific base, having the formula C5 H13 N O, resulting from the putrefaction of mammalian flesh. The author promises still further to investigate the products of the reactions of micro-organisms upon organic matters.

The evidence that microphytes (aside from any discussion as to

their specificity) act as ferments without whose presence putrefaction does not occur, has given lately considerable prominence to the method of biological examination of suspected water, and although this has not yet been sufficiently prosecuted to establish it on the basis of scientific accuracy, its indications encourage a hope of its increasing value in the near future. It is certain that the number of colonies of bacteria appearing in a solid nutritive-gelatin medium, inoculated with different specimens of water, and the rapidity of the liquefaction of the medium under their influence, are not proportioned to the amount of impurity predicated by chemical analysis, but do seem to bear a relation to the pathogenic properties of the water. The present state of our knowledge on this subject was summarized in a paper before the International Pharmaceutical Congress at Brussels in September last, by M. Van de Vyvere, whose conclusions are that a potable water should not contain either any of the so-called colorless algæ, many infusoria, or bacteridiæ; that the addition of sugar should not lead to the development of fungi; and that when cultivated in gelatine it should not produce numerous colonies of bacteria, nor should these cause liquefaction of the medium in less than eight days.

Both experience and experiment show that the alleged self-purification of running water occurs to but a limited extent, and in most instances the supposed phenomenon is explicable rather by dilution than by purification. In the case of the river Irwell, which after receiving pollution at Manchester, runs eleven miles and falls over six weirs in its course to the Mersey, chemical analysis could detect scarcely any appreciable purification at its mouth. Indeed, the conclusion of the Rivers Pollutions Commission, in the famous "Sixth Report" was that there was no river in the United Kingdom long enough to purify itself if contaminated by sewage near its source, and that, "in the case of river water, there is great probability that the morbific matter, sometimes present in animal excreta, will be carried rapidly down the stream, escape decomposition, and produce disease in those persons who drink the water; for the organic matter of sewage undergoes decomposition very slowly when it is present in running water."

Filtration, by any method practicable on a large scale, although it will arrest suspended particles and may thus greatly improve the condition of a water in some respects, is not to be depended on as regards matters in solution, nor, except in laboratory experiments

with porcelain, to remove bacterial organisms. Chemists filter the very reagents which they employ in their analyses, knowing well that no weakening of the solutions is thus caused, and physicians and pharmacists constantly use the same process in their practice.

In view of the uncertainty of both chemical and biological examinations in the present state of our knowledge, the greatest importance attaches to the purely physical inspection of the surroundings of a source of water-supply to ascertain if there be any possible danger of its contamination, and if this be discovered, and cannot be surely prevented, the water is to be shunned, irrespective of all analytical testimony in its favor. As Corfield observes, "the average quality of a drinking water supplied to a place is not the matter of most importance, and, indeed, is rather a fallacious guide. What we want to know is the quality of the worst sample that the public are likely to be supplied with at any time." Simon's statement, that "it ought to be an absolute condition for a public water supply that it should be uncontaminable by drainage," is indorsed by the opinion of Parkes (Quain's Dict.) that "the great point in choosing water is, in practice, its freedom from any change of contamination with excreta or with refuse matter from habitations;" and it would be easy to multiply quotations from the most eminent sanitarians to the same effect. It is this probability of contamination which renders rivers the least desirable sources of supply everywhere, and especially where riparian communities are allowed to discharge large volumes of sewage into them, or where their banks permit the inflow of surface washings from cultivated land.

When any suspicion attaches to a particular water, and it is impracticable to procure a pure supply without delay, recent experimental researches warrant the belief that it may be rendered innocuous for temporary use by boiling. Although the crucial test of actual experimentation with the various contagia has not been applied, there is sufficient evidence that the "pathogenic" bacteria associated with most of the infectious diseases are unable to withstand boiling for half an hour or even less. On the other hand, a temperature much below zero does not destroy the vitality of these micro-organisms, and freezing is ineffective, either from a chemical or biological point of view, in purifying water. For this reason as much care should be exercised with regard to the source of ice as of water for potable purposes. The greater part of the salts, even those which constitute the "hardness" of water are expelled in

congelation, but other and more deleterious matters in solution may remain almost undiminished, and organic substances in suspension, as well as different varieties of bacteria, may be retained unaltered.

ALFRED LUDLOW CARROLL, M. D.

SANITARY COMMITTEE.

REPORT OF THE SANITARY COMMITTEE.

The work of the sanitary committee has consisted in making a sanitary examination in localities where special disease or danger of disease was alleged to exist, and in giving such expert advice as seemed to be required in each case. The reports on these examinations are herewith given.

At Catskill, the complaint arose from alleged improper disposal of garbage, but Dr. Curtis, acting as inspector for the State Board, finding other insanitary conditions, went over the whole question of the sanitary improvement of the town with the local board of health, giving them the advantage of his advice and experience in village sanitation.

At Johnstown, the complaint arose from the pollution of a mill-race, which when drawn down was liable to engender disease.

At Rhinebeck, which has been before the Board for some time, the alleged insanitary conditions existing were first investigated by the drainage committee. Its report of the conditions prevailing in the coves cut off from the river by two railroad embankments and of the conditions prevailing in the neighborhood was such, that it was not possible to fix upon the coves complained of as the source of disease. The matter was referred to the sanitary committee as involving the question of the causation of disease. A number of conditions seemed to be acting to produce malaria in the neighborhood of Rhinebeck, and the views of the committee regarding them are set forth in the report.

A nuisance caused by the accumulation of logs off the shore of Grand island in the Niagara river, of which complaint was made on account of the legal questions involved, the matter has been referred to the Attorney-General for his opinion as to the powers of the State Board to act in this matter.

One of the most important sanitary investigations made under the committee was that at Gouverneur, St. Lawrence county, where Dr. Curtis found that cerebro-spinal meningitis and diphtheria were prevailing to an alarming extent. The cause of the disease appears to be directly traceable to soil saturation, and the question was, therefore, referred to the committee on drainage, sewerage and topography, in the report of which are given full descriptions of the case. The sanitary committee found that twenty-five per cent of the deaths from zymotic diseases can be prevented if proper sanitary measures be taken by the village.

Another very important case, involving the water supply of a large city, will be found in the report on the investigation of a water

supply for Syracuse. At the request of the citizens, the committee visited Syracuse and held a public meeting, where, in response to numerous questions, the committee gave their views respecting the methods of sanitary investigation necessary to pronounce upon the wholesomeness of a water supply. Entirely too much confidence is felt by the people at large in the results of chemical analysis of water. The dangers which threaten water supplies are by no means in direct proportion to the chemical purity of the water. It is the specific character of the polluting material more than its quantity that makes water dangerous. An examination, therefore, of all its sources of pollution is the most important factor in determining the sanitary character of a water supply. This principle, which has not been understood, the committee endeavored to explain and illustrate to the citizens of Syracuse. Such sanitary investigations of water supplies can only be made by persons of large sanitary experience with the knowledge and sagacity required to detect the possible dangers which threaten the purity of waters, or foresee those likely to arise in the future.

This question of the sanitary examination of potable waters, which has heretofore been largely left to the chemist in the laboratory, must, in the light of present knowledge, be treated in a far more comprehensive and thorough manner.

The question of the ice supply of Syracuse was also brought before the committee by its local board of health. The committee have not been able to make a final report on this question until analysis has been made of the ice cut from certain points which are described in the report.

A synopsis of the sanitary laws of Great Britain and the United States with the decisions of the courts on sanitary questions, compiled by Hugh Weightman, Esq., is also given and will be found of great value for sanitary purposes.

WOOLSEY JOHNSON,
Chairman.
ALFRED MERCER.

June 12, 1885.

Dr. ALFRED L. CARROLL, *Secretary of the State Board of Health:*

DEAR SIR — An application was received at the office, on the 10th inst., from the board of health of the village of Johnstown, through the health officer, Dr. J. E. Burdick, for inspection and advice from the State Board respecting an alleged nuisance in that village. In response to which I visited Johnstown the next day, and herewith report the conditions found, for your information and action.

Johnstown is one of the oldest incorporated villages in the State, the capital of Fulton county, and has a population of about 6,000. It is situated on rolling, hilly upland, having a clayey,

loam surface on a calciferous bed. Its business consists chiefly of the manufacture of leather and gloves. Three or four miles north of it is Gloversville, a village of 8,000 inhabitants. Both of these considerable villages are located on the Cayadutta creek, which rising in the northern part of the town empties into the Mohawk near Fonda, four miles south of Johnstown. This creek receives most of the sewage of Gloversville and also a part of that from Johnstown. Entering the corporate limits of the latter at the north-east, its bed passes southerly through the edge of the cemetery grounds, then turning directly west it traverses the village to the north of its most thickly settled portion and again turns southerly and passes out through the western part of the village. At the point where it turns west it receives the water of a small meadow creek just after it passes through a mill pond; also as it turns south the outlet of another pond empties into it, the water of which comes from another small brook.

At the northern village outskirts a dam is thrown across the Cayadutta creek and its water turned into a mill-race. This runs in a generally straight course for about half a mile west and the water passes into conduits under ground to several mills for the manufacture of leather, finally returning to the original bed of the creek below. It is this mill-race which is the source of complaint, on the ground that it is polluted by sewage along its banks and from Gloversville above. It has existed for its present purpose for very many years.

At the time of my visit this race diverted all the water of the creek, none passing over the dam; this is generally the case. The artificial channel is about ten feet wide and the bottom was entirely covered except at a few points where the edges for a certain distance being shelving, the ground is marshy. On one side the bank is abrupt and well kept; on the other, the land not being owned by the company, it is uneven, much of the way grown up with bushes and often marshy. The water is of a brown dark color, but transparent, although carrying in suspension particles of dark-colored, apparently vegetable material. It has much the appearance of water flowing from a peat swamp, but the color is said to be due to the water from tanneries flowing into it and the dye-stuff of leather. The channel has a fall of perhaps two feet in its entire course, and the flow is moderately rapid, water being nowhere stagnant; it was perhaps two feet deep in mid-channel. The entire amount passes at its head through a circular conduit two or three feet in diameter. The bottom is muddy with silt, and it requires cleaning out once in two or three years. Long grasses grow in it beneath the water. The first half of it runs through pasture land, no houses being near. It receives a few house drains, to be seen projecting into it. Further down a horse-car barn is immediately on its bank, leachings from which and a large manure pile pass directly into it. A little further, drippings from an ice-house keep the ground wet, and there is another barn and yard for hens, all on the edge of the bank. Then, a shallow ditch for carrying surface water

causes a set-back for some distance and the bank is flat and marshy and grown up with flags. One or two privies are upon the edge of the bank and a few more house drains empty into it. There are not many dwellings near, however, as it runs through a sparsely-settled outskirt of the village. Toward the lower part of its course refuse matter and tin cans are observed in the bottom. There is also considerable floating material, sticks and vegetable matter mostly. At its terminus a strainer arrests these, and it is found necessary to remove them very frequently.

You will observe the points of danger are, the sewage from above, that from several houses, and the pollution from barns, privies, etc., on the bank. Then there is the silting up of the bottom, the refuse waters thrown into it, and the irregularity of the bank on the north side.

Another point, not alluded to, is also the exposure of the bottom by drawing off the water below a safe level. This I am told occurs when there is low water in the summer time. A resident informed me that at such times there is a green scum on the water, the bottom is uncovered and the smell very bad. This was the case in the neighborhood of the horse-car barn. At the time I saw it there was nothing offensive about the stream.

There appears to me little serious ground for complaint as to the condition existing at the time of my inspection, but there is a good deal of possible evil in it which should be certainly guarded against. Being in a quite sparsely-inhabited outskirt of the village the problem is simplified since there are fewer exposed to it and less chance for its pollution. There will come a time with the expansion of the village when it will be necessary to convey this water in a closed pipe to the mills. For the present it appears to me that with a few less radical precautions the present mill-race will be safe. The faulty bank should be rectified at all the points where it is irregular and sloping. The entire channel is much wider than is necessary, but could not probably be narrowed except by stone work, as the banks would wash. But the present banks should be made abrupt and the soakage in the soil, making marshy places with more or less contaminated water, should be at once rectified. For the purpose of not impeding the current overhanging bushes should be trimmed away. All coarse refuse should be removed, such as cans, hoops, and similar waste. The bottom should be cleaned every year; it is questionable whether it would be safe to expose it during this summer weather.

Besides these improvements of the channel certain regulations ought to be adopted. (*a*) The water should, under no circumstances, be allowed to be drawn off so as to expose the bottom to any degree. (*b*) House drains should not be permitted to empty into it. The village is supplied with sewers as well as with an excellent public water supply, and connection could probably be made with them for all premises needing sewerage. (*c*) The pollution of the water by

the barns and privies on its bank should be at once stopped and all present accumulations from them should be cleaned up. Little account need be taken of the Gloversville sewage; the defilement comes from these sources nearer home. (*d*) Refuse matter should be kept out by prohibition and by frequent inspection and removal. With these precautions I think little danger need be apprehended from this mill-race.

While this was the principal object of my going to Johnstown, my attention was called to a few other insanitary conditions, some of which I gave verbal advice concerning.

There is an offensive way of disposing of the waste from these leather mills. It runs out into rough, stony and clogged-up open drains along the sides of the street. Being composed of chemicals, dye-stuffs and animal refuse an unhealthy effluvium must arise from it in hot weather. Closed drains ought to be provided, or at least some attempt should be made to provide a smooth channel on the surface.

Two mill-ponds and the portion of the Cayadutta creek bed that is part of the time dry may also require consideration. For the present, however, they do not call for reference in this report.

Respectfully submitted,

F. C. CURTIS.

REPORT ON THE SANITARY QUESTIONS INVOLVED IN THE CONSIDERATION OF THE COVES NEAR RHINEBECK.

To the Sanitary Committee:

The condition of the coves which form the subject of the report of Mr. Andrews, published in the fifth annual report of the State Board of Health, and their influence, if any, upon public health, was brought before the Board in 1883, and referred for investigation and consideration to the committee on drainage, sewerage and topography. The conclusions of the committee then were, that since malarial fevers had been known to prevail along the Hudson river for very many years, the building of the railway could not have been the only factor favoring the development of the disease; and, as it was necessary to have reasonable assurance that the suggested improvements in the construction of the embankments were necessary for the preservation of life and health before recommending the issue of an order by the Governor, the Board confined itself to advising that the railway companies should be requested to make proper provision for a freer movement of water in order to allow the egress of any floating dead vegetation which might accumulate within the coves. This action was taken from a purely engineering point of view, and the investigation on which it was based was limited to the specific question presented by the Governor, to whom the original complaint was addressed; the State Board not being authorized to extend its inquiries to other probable causes of endemic disease, and being unwilling to commit itself to a positive opinion on the etiological aspect of the problem.

A later appeal, made directly to the State Board for advice as to the sanitary questions involved, however, necessitated a wider examination; last autumn I accompanied Mr. Gardiner in a more comprehensive tour of inspection, embracing the telluric environment of the houses where malarial disorders were alleged to have been most severe.

The first fact elicited was, that paludal fevers were common over a wide region of country, extending some miles back from the shore, and in nowise to be ascribed, by any stretch of imagination, to influences arising from the river front. It was also evident that in these instances, as in the few houses on the margin of the coves, other conditions existed fully capable of giving rise to malaria.

The embankment of the H. & C. W. R. R., on the eastern side of the north cove, shuts in a sort of ravine parallel with the shore, which probably formed the bed of the brook that is now turned

through a small culvert further to the north. In this ravine, dead vegetation had accumulated to a considerable depth, and in rainy seasons must be placed under the most favorable conditions for fermentation. A depression running first easterly and then southerly from this point, and receiving the drainage from a wide water-shed, constitutes a veritable marsh throughout which the ground water stands actually at the level of the soil; and even on the adjoining places at a higher elevation, the wells which we examined were filled to within three or four feet of the surface. Still farther back, on the plateau whereon the village of Rhinebeck stands, and, indeed, wherever malarial disorders were said to exist, we found the same condition of soil saturation. On the shore of the cove itself, the dead vegetation was almost entirely of land origin, and was hardly sufficient in amount to occasion deleterious emanations.

As far as observation of the causation of malaria has extended, there is reason to believe that the poisonous ferment is generated rather by the decomposition of vegetable matter in a damp soil than on the surface, or where submerged; and experience warrants the opinion that flooding a miasmatic district is sometimes as effectual a remedy as draining it. Living submarine plants, of course, are not to be regarded as injurious to health, and it may be doubted if they can exert a seriously detrimental influence, even after detachment from their roots, while floating on water which is not stagnant, although if stranded on the shore in considerable quantity their decomposition might be hurtful. Hence, while not denying the possibility that under certain circumstances the condition of the larger coves might conduce to the perpetuation of malaria, other and more potent agents are so evident that these cannot be condemned from a purely sanitary standpoint, however objectionable they may be in other respects.

The case, however, is different as regards the smaller pond inclosed by the embankment of the H. & C. W. R. R. The culvert here is, according to both engineering reports, insufficient to permit free circulation of water, and, in addition to the vegetation decaying *in situ*, much drainage from buildings on the shore is received in the almost stagnant basin, the effluvia from which are very offensive, and doubtless capable of injuring health. It would seem reasonable to demand that the railway company provide for proper circulation of the water in this cove, but beside this measure, the local board of health should prevent the discharge of any organic refuse into the basin, and compel the riparian owners to remove nuisances from their own premises. The effectual abatement of malarial endemic fevers depends upon drainage of the saturated land bordering the coves rather than upon any operations relating to the water. The very term "marsh miasm," commonly applied to the malarial ferment, indicates the universal experience of the pre-eminent agency of soil-saturation in inducing the disease; and wherever thorough drainage has been accomplished, malarial fevers have been abolished.

ALFRED LUDLOW CARROLL, M. D.

The sanitary committee, to whom the reconsideration of the former reports on the condition of the above described coves was referred, concur in the views expressed by Dr. Carroll, and in the suggestions made for the improvement of the public health in that vicinity; and, as regards the smaller pond, recommend the adoption of the measures set forth in the report of Mr. Andrews, as published in the fifth annual report of the Board, namely: that, in addition to providing freer circulation of water, "the low places on the shores be filled as rapidly as possible, thus diminishing the area to be kept clean."

WOOLSEY JOHNSON, M. D.,
Chairman
ALFRED MERCER, M. D.

REPORT ON DIPHTHERIA AT GOUVERNEUR.

To the Sanitary Committee, State Board of Health:

Gouverneur is a rapidly-growing village of nearly three thousand inhabitants in the south-western part of St. Lawrence county, about thirty-five miles from Ogdensburg. It lies on both sides of the Oswegatchie river, a rapid and considerable stream, extensively used for lumbering, and at this point for mill power, flowing between banks that are abrupt and well elevated about fifteen feet above the stream. The country about is uniformly level, rolling land, the surface soil being alluvial sand and quick sand, not fertile; the under-lying rock is lime-stone which crops out near the village; above it is clay having an average depth beneath the surface, I was told, of some ten feet. The site of the village is broken by slightly elevated ridges, and one or two small streams flow through it, maintained by neighboring springs, on either side of the river into which they empty. Formerly forests of cedar and hemlock covered this locality; farther up the river there are said to be peat bogs from which some of its tributaries flow. Throughout this township and much of this region there is a remarkable degree of soil saturation. In most places, regardless of topography, water is reached within two feet of the surface; consequently throughout a considerable portion of the village, many of the cellars contain standing water, especially during wet weather; some of them are always wet. The wells throughout the village are sunk probably through the clay, and are from fifteen to forty feet deep, their contents rising pretty near the surface.

There is but one sewer in the village, in the main street, said to be the healthiest part. There is a public water-supply, but it is not used to any great extent, from popular prejudice. The water is slightly stained of a brownish color, probably from vegetable matter, but the taste is not unpleasant. It is taken from the river directly above the dam, at the center of the village, the stream being set back a considerable distance between the high banks.

In the monthly bulletin of this Board, the mortality of the town of Gouverneur has been recorded since May, 1884, with the exception of one month. In seventeen months one hundred and fifty-six deaths occurred. This represents an annual death-rate per thousand inhabitants of twenty. Of these, thirty per cent were under the age of five years. Of the number, eleven deaths were from cerebro-spinal fever, two from typhoid fever, one from measles, seventeen from scarlet fever, nineteen from croup and diphtheria, and nine from diarrhœa, making a total of fifty-nine deaths from zymotic or preventable diseases.

This, it will be observed, amounts to nearly thirty-eight per cent of

the total mortality. During the same period the percentage of zymotic disease mortality for the entire State amounted to 25.9, which, including the cities of the State with their large summer mortality from diarrhœa, is considerably higher than it would be if only the rural population were taken. This mortality in Gouverneur is principally made up of cerebro-spinal fever, which occurred in almost every one of the months referred to, but has been much more prevalent since January last; of scarlet fever, which prevailed from December to May last; diarrhœa, occurring only in the summer months; and croup and diphtheria, which in our sanitary records are classed together on account of the frequent difficulty of distinguishing them apart, and which began to cause deaths in December, 1884, since which time there are but two months in which they failed to occur. It should also be noted that there were seventeen deaths from consumption during the period of time. About fifty per cent of the mortality occurred from zymotic diseases and consumption, or in other words, nearly half the deaths were from consumption, cerebro-spinal fever, scarlet fever, croup and diphtheria and diarrhœa.

This has been the reported mortality of the entire town; for the village alone all these proportions would be exaggerated, since beyond doubt most of the preventable deaths occurred in it.

December 4, in response to the representations of certain citizens of the village to the effect that diphtheria was alarmingly prevalent, and on the invitation of the local board of health, I went at the request of the Secretary of this Board, to investigate the facts and conditions at Gouverneur, in company with the health officer of both the village and town boards, Dr. J. B. Carpenter. Our inquiry was limited to the village, although the disease has prevailed throughout the town to less extent.

From him I learned that fifty-two cases of the disease had been reported to the town board since July last, and eleven deaths had occurred. The disease had culminated early in November, when four deaths occurred; for about four weeks there had been no deaths, and at the time of my visit there were but two persons sick with the disease.

Of the reported deaths under the head of croup and diphtheria, part were attributable to the former disease. This epidemic came on with, or followed after, one of scarlet fever, which, as noted above, prevailed from December to May last, and which was attributed to an imported case. Care had been taken to quarantine and afterward to fumigate in all cases known to the Board, and all children from families where the sickness occurred were excluded from school. With Dr. Carpenter I visited premises where cases existed or had been. The disease first extensively prevailed in a row of tenement-houses on the south, or less built up part of the village. Here the sanitary conditions had been very bad; the cellars were full of water, which had increased by recent rains; a single large privy, used by several families, was in a foul state, and

all garbage and slops were thrown on the ground about the house. At this locality all this had been rectified under direction of the Board, the cellar being easily drained into an adjacent streamlet — since then no cases had occurred.

A similar experience attended another row of tenements in the same neighborhood, and subsequently cases developed in various parts of the village.

Without speaking in detail of these I will present what appeared as the possible and suspected causes of the prevalence of the disease.

First, in regard to the drinking water. As already remarked, the village has a public supply, taken from the Oswegatchie. It is pumped from the river just above the dam, which is about midway of its course through the village. The stream always contains quantities of logs, above and below the dam, and some of the citizens have thought that these were a source of unhealthfulness. However this may be, I see no reason why it should contribute in any way to causing diphtheria. But the stream may be polluted by the organic waste from the village. At present the only village sewer, and also the largest of the little streamlets which traverse the village empty into it below the dam; but some of the house waste already finds its way into the stream above the dam, and eventually a considerable amount will be likely to, as the village grows. Worse than this, however, the village cemetery is immediately on the south bank of the river, its area elevated and sloping rapidly toward it. Probably many of the graves extend below the ground water level, and at any rate the drainage is ultimately into the stream. It is only eighty or 100 rods above the intake. This cannot, therefore, be recommended as a safe place to take water; but as to its present condition Dr. Hailes will report a biological examination of a sample which I procured. I know of no objection to the purity of the water taken from a point above the village. The water is, however, objectionable to the people, and is but little used. As to its entering as a cause of the diphtheria, I ascertained that only two or three families that had been afflicted made use of it, and the first cases of this immediate prevalence occurred on the south side of the river, which has no public water supply. It is undoubtedly safer water than that of the village wells, which are sunk into soil admitting of such ready pollution. A sample from one of them will also be reported on by Dr. Hailes.

The high level of the ground water is in my opinion, as also of health officer, Dr. Carpenter, the most important element in maintaining diphtheria here. It is one of the recognized causes of the disease, as is shown by numerous studies of its development, among which reference may be made to a report to the Massachusetts Board of Health, in 1876, by Dr. J. G. Pinkham, of an epidemic in Lynn, where eighty per cent of the cases occurred on damp, undrained soil, and especially to the more recent report of Mr. James T. Gardiner to the New York State Board, of which he is the consulting engineer (see Fifth Annual Report), upon an epidemic in Ogdensburg,

where almost identical conditions existed as here. The dampness or flooding of cellars resulting from high ground water acts, as Mr. Gardiner suggests, in two ways: by predisposing to a catarrhal condition of the air passages, which renders them more vulnerable to diphtheria, and, also, by poisoning the air of the dwelling with decomposing matter carried in with the soil water. A little reflection on the part of the villagers will convince them of the reasonableness of this. Having no sewers, all slops and excremental matters are deposited on the ground about the dwellings. Kitchen waste is thrown generally upon the surface, and privy accumulations are either on the surface or in a shallow pit often containing soil water, for I believe no sort of removal system is attempted. In such a porous soil these sink readily, are soon taken into solution in the ground water and find their way into the cellar or the well. In the former case there is every facility for decomposition to take place, and the upward draught of the warm air above distributes the products of decomposition through the dwelling.

That this is a very important element in the existence of diphtheria in Gouverneur is seen from the fact that a large proportion of the cases have occurred in houses in which there has been standing water in the cellars. In others, where there is no actual standing water, it will, no doubt, be found that there is an unhealthy degree of moisture in the bottom and sides of the cellar. It is further seen from the fact that it disappeared from the tenement-houses, where it first broke out, as soon as drainage of the cellars was effected, and on the main street, through which there is a sewer and the cellars are dry, only two or three cases have been found, and these, there seems good reason to believe from what I learned, were traceable to the third apparent element in the production of the disease in the village — contagion. This was generally guarded against by the management of the Board, but one case failed of being reported to them, and from it the disease was taken to the schools. One of the children taken with the disease on Main street sat beside a child from this family.

Some of the cases were not traceable to either of the causes I have mentioned, and were due I believe to local insanitary conditions, in which probably the well water had a part. I found a case already existing and the third or fourth case in the family. The house was very dilapidated; the well close by the kitchen door, outside of which slops were thrown, and fifteen or twenty feet away was the privy and a stable. (See report of Dr. Hailes upon this water.) The premises have a bad sanitary record of typhoid fever and other zymotic diseases. Every epidemic of diphtheria of long duration shows instances similar to this, the local insanitary conditions finding expression in the prevailing epidemic by preference.

My conclusion is that the prime factor in the prevalance of diphtheria in Gouverneur is the remarkable high level of soil water. This is, to be sure, no new thing here, neither is the disease. Dr. McFalls, who has practiced there for many years, tells me that the

disease has prevailed for a long time, not only in the village but in the surrounding country, where similar conditions exist. During the past season this has been intensified by unusually wet weather. By reason of it, as Dr. Carpenter states, the potato crop has been a failure, these and other vegetables rotting in the ground. It is further increased by the very rapid rate at which the village is growing, for in few places have I seen so many houses new or in process of erection. It is further shown, I think, by the considerable death-rate from consumption, and in the same connection the unusual number of deaths from cerebro-spinal fever, here and elsewhere in this region, is of interest. In the forthcoming sixth annual report of this Board, the Secretary, Dr. Carroll, calls attention to soil saturation as the best established factor in the causation of the latter disease, very clear evidence of which appears in Dr. Meredith Clymer's study of the outbreak of it in New York in 1872. With a high death-rate, nearly half the mortality has been from diseases that may be considered more or less preventable. And they are deaths that, as far as we know them, are especially preventable by drainage and cleanliness. Whatever else may enter into the causation of diphtheria and other diseases here, I have no hesitation in saying that drainage of the soil and lowering the water in it to a safe level below the cellar bottoms is the first necessity. How this may be effected, and to what extent a system of sewerage which is likewise desirable might be added to it, I will not undertake to speak of, as advice in this should be given by a civil engineer. I am sure, however, that a remedy is very feasible from the topography of the village.

With regard to the public water at present in use, while it does not seem to be an evident cause of prevailing disease, there is reason to believe that it is already to some degree polluted, and with the increase of the village, the introduction of sewers and the growth of the cemetery it would become more so, taken from the present point. It would be much better to take it from some point entirely above the village, where the current is rapid, the animal waste entering it slight in amount, and the water doubtless wholesome and good. Of this I have no knowledge, however, from personal observation, and perhaps some more desirable source may be found to take the place of the present, which cannot be commended. With these improvements the death-rate of Gouverneur would be materially diminished.

Throughout the township the same condition of soil saturation undoubtedly exists, and has the same bearing on the production of diphtheria, some of the cases of which, reported in the bulletin referred to in this report, occurred outside the village limits; the remedy is the same for the isolated farm-house as for the village residence, and is feasible generally, or ought to be, to make the house fit for habitation.

Respectfully,
F. C. CURTIS.

ALBANY, *December* 10, 1885.

Dr. A. L. CARROLL, *Secretary State Board of Health:*

DEAR SIR — Upon biological examination of the specimens of water sent to me from Gouverneur, I respectfully report as follows:

LOCALITY.	Date of culture.	Time of first appearance of micro-organisms.	Time of beginning of liquefaction of gelatine.	Extent of liquefaction in four days.	Chlorine in parts of 100,000.	Observations
Hydrant water, Oswegatchie river.....	Dec. 7..	36 hours..	3 days..	3-4 inch.	1	Micro-organisms quite numerous.
Hydrant water, Oswegatchie river.....	Dec. 7..	36 hours..	3 days..	1-2 inch.	1	Micro-organisms quite numerous.
Water from tenement-house, Wm. Whitney.	Dec. 7..	24 hours..	2 days..	2 inches	10	Micro-organisms exceedingly numerous and liquefy gelatine rapidly.
Water from tenement-house, Wm. Whitney.	Dec. 7..	24 hours..	2 days..	2 inches	10	Micro-organisms exceedingly numerous and liquefy gelatine rapidly.

The water from the tenement is very bad — ten parts of chlorine, and the bacteria exceedingly numerous and active. The river water is better; possesses very small proportion of chlorine (one part) but it cannot be recommended with safety on account of the short time required to liquefy the gelatine (three days) and the number and activity of its micro-organisms.

Very truly,
WM. HAILES.

REPORT OF THE SANITARY COMMITTEE ON THE INVESTIGATION OF A WATER SUPPLY AT SYRACUSE.

To the State Board of Health:

The common council of the city of Syracuse, on the 23d of March, 1885, passed an ordinance granting to "the Central City Water-Works Company" a franchise for supplying the city of Syracuse with water which, "upon analysis by the State Board of Health, shall be pronounced to be pure and wholesome."

This was practically a request from the city of Syracuse that analyses should be made of the water proposed to be furnished, and that this Board should state whether these chemical analyses showed the water to be up to the standard of purity as commonly accepted for potable purposes.

Doubtless the object of this request was that the analyses might be made by such men and such methods as this Board is in the habit of employing in its chemical analyses of water.

Under this view of the case the Board caused seven samples of water to be analyzed, taken from the Oneida lake; two by Prof. Willis G. Tucker, of Albany, and five by Prof. S. A. Lattimore, of Rochester University. The results of these analyses are herewith appended. They show that in parts by weight per hundred thousand the results range as follows: Total solids, from 14.22 to 16.80; chlorine, from 0.32 to .454; free ammonia, from trace to .0027; albuminoid ammonia, from .002 to .0045.

Certainly on chemical grounds *alone* no exception could be taken to the samples of the water analyzed; and, in response to what the Board interpreted to be a request from the common council of Syracuse, a resolution was passed at the meeting of the Board on November 16, 1885, stating that these analyses had been made by the official analysts of the State Board of Health, and that the water, according to accepted chemical standards of analysis, was found to be pure and wholesome.

It was not to be supposed that because the water was pure from a chemical standpoint, that, therefore, from a sanitary point of view it was proper as a water supply for the city of Syracuse. In the discussion at the meeting previous to the adoption of the resolution the Board was unanimous in the opinion that a chemical test is but one of the methods necessary to determine the potability of a water; nor did the Board express any opinion as to whether the chemical condition of the water of Oneida lake, at the time the samples were taken, would be its uniform condition the year through. All that the resolution was intended to express was the fact that the samples analyzed were pure according to received chemical standards

Notwithstanding the careful wording of the resolution expressly limiting its meaning, it was found that its scope was misunderstood both by the common council of Syracuse and by the citizens at large.

The citizens' committee of Syracuse then requested a full investigation and explanation of this subject by the State Board of Health; in response to which this committee, having been empowered by the Board, held a public meeting in the city of Syracuse, December 8, 1885, of which due notice was given to all parties interested, in order that a more correct understanding might be arrived at regarding the wishes of the citizens of the city of Syracuse, and the views of the Board with reference to the sanitary examination of water supplies.

The town hall was secured by the citizens for the meeting, and its management was assumed by a citizens' committee. Your committee was represented by the President, Dr. Edward M. Moore, the Secretary, Dr. Alfred L. Carroll, together with Dr. Alfred Mercer and consulting engineer James T. Gardiner.

At half-past ten A. M. when the committee arrived at the hall, it was well filled with members of the common council and other prominent citizens, his honor the mayor being also present. The meeting was presided over by Mr. Duguid, president of one of the city banks.

As the citizens desired to know exactly what the State Board had done in the matter, President Moore explained the action above described, and in answer to numerous questions, the views of the Board with regard to the sanitary examination of water supplies were set forth by Dr. Moore, Dr. Carroll and Mr. Gardiner. The recommendations of the committee with regard to the leading outlines of the sanitary examination of a potable water supply were as follows:

1. Before any supply of water can be pronounced pure and wholesome for a city's use, it should be submitted to chemical analysis, the samples being taken at such times during the year and during such varying conditions of the water as would represent the chemical character of the water in its principal changes.

2. It should be submitted to biological analysis, the samples analyzed being taken at all seasons of the year and in all conditions of the water, when these conditions are quite variable.

3. Sanitary examination should be made to determine all the sources from which impurities may reach a water supply, and the question of a probability of its remaining pure in the future, and the possible means of sanitary protection of the water should be carefully considered. This sanitary survey is considered the most important of all.

CHEMICAL ANALYSIS.

By chemical analysis and the examination of the chemist there may be determined the amount of mineral matter in the water and its character. Whether the water is a hard or a soft water, and the degree of hardness may be estimated. A part of this analysis of the mineral constituents is the determining of the amount of chlorine, which is sometimes an indication of the amount of sewage pollution of water.

The amount of putrescible organic matter in the water may also be approximately determined; and analysis will often indicate whether the water contains the products arising from putrefaction.

The character also of the organic matter in the water is sometimes indicated by the analysis. The color of the water and its taste and odor may also be made the subjects of examination in the chemical laboratory. In general, therefore, the examination of water by the chemist determines its hardness, the amount of organic matter liable to putrefy which it contains, its taste, odor and color, and sometimes the character of the organic matter in solution.

While these facts are of great importance, they are by no means the only things it is necessary to know before declaring a body of water to be a wholesome supply for city purposes or for potable uses. Chemistry cannot determine whether water contains those micro-organisms or bacteria which are the cause or carriers of disease. It can rarely determine the source of the contaminating matter found to be present. Some of the most severe epidemics have been caused by water where the actual amount of organic matter was exceedingly small. Frankland, the celebrated English sanitary chemist, having carefully analyzed a measured quantity of water, added to it one-thousandth part of its volume of the dejecta of a cholera patient, and was unable, by chemical analysis, to detect any difference that would have awakened suspicion of danger. This experiment of Frankland's well illustrates that a water may be freighted with the fatal germs of disease and yet chemistry be unable to reveal it.

Biological Analysis.

Biological analysis has recently been brought into use as a method of determining approximately the amount of bacterial life contained in the water. This is accomplished by putting into a sterealized gelatine solution a drop of the water to be tested, and excluding the air. Where the water contains a large number of spores or developed bacteria their rapid multiplication soon breaks down the gelatine solution. It is assumed that the relative rapidity at which the gelatine solutions are broken down and the comparative number of bacteria produced are a measure of the relative number of bacteria contained in the different waters tested.

While the biological analysis of water is as yet too new to be an absolute guide, yet its results may throw much light on the question of the sanitary character of a water supply. But notwithstanding the valuable aids of chemistry and biology in determining the purity of water, it is clearly proven by the history of disease that a supply of potable water for a city might be in serious danger of creating an epidemic and yet that fact not be discoverable either by chemical or biological analyses. The *sanitary survey of the water-shed and sources from which the water is derived is often the most important method of determining the wholesomeness of the water.*

SANITARY SURVEY.

In a sanitary survey the geology and topography of the water-shed and the artificial and natural storage basins are considered in connection with the uses made by man of the water-shed and water-courses. The disposal of all human and manufacturing wastes is examined in its relation to the water supply; and should it be found that objectionable matter is likely to reach the proposed water supply, the possibility of protecting the water from such pollution, both in the present and future, is carefully considered.

The sources of pollution of water may not be constant, but may be operative only at certain seasons of the year. Where such conditions are suspected it is necessary to examine the waters throughout the season. Some lakes, the water from which is perfectly palatable through the autumn, winter and spring, are liable during the summer to the growth of low forms of vegetable organisms in such quantities that their decay imparts to the water a most disagreeable taste and odor. In comparing a number of water supplies, while chemical analysis may determine the chemical purities of the waters to be compared, it by no means follows that the water chemically purest is the best. A sanitary survey is necessary to determine the sources of these impurities; for the one least in amount may possibly be the most dangerous.

The water which was determined to have produced the epidemic in Plymouth during the past year was chemically the purest of the three sources of supply for that town. The epidemic was traced to the excrement of one typhoid patient being thrown upon the snow and washed into the stream which supplied the reservoir.

There are around Syracuse a variety of sources of water supply of greater or less value from an engineering and sanitary point of view. Each of these is probably liable to its particular class of dangers which may occur at different seasons of the year.

The city is, of course, desirous to secure the best water. The only method of determining which is the best among these sources which are admitted to be practicable from an engineering and financial standpoint, is to thoroughly examine them by chemical, biological and sanitary means at the seasons when the special weaknesses of each supply are likely to be most fully developed.

To complete a work of such magnitude in a thorough manner and prepare an exhaustive report would doubtless require a year; but without such complete survey the State Board of Health would not be willing to pronounce any one of the water supplies as most desirable for the city of Syracuse from a sanitary point of view.

In response to the question whether the State Board of Health would be willing to undertake to examine the possible water supplies of the city of Syracuse, and report to the city the best one from a sanitary standpoint, President Moore replied that the Board would undertake the work, provided they were requested to do so by the common council of the city, and provided the appropriations by the Legislature were sufficient for the purpose.

As regards the possibility of the purification of the water it was

stated by the committee that the grosser particles in suspension in water might be removed by filtration, but that impurities in solution and micro-organisms, which are the carriers of disease, could not be so removed with any certainty in treating water on a large scale through a series of years. While laboratory experiments have been successful, the efforts made in this direction in treating large quantities of water have eventually been failures.

The question was asked the committee, whether from a sanitary point of view it was more desirable that a water supply should be under the control of the city rather than the property of a private company. President Moore answered that the committee would prefer to consider this matter before answering. The committee have considered the question, and after reviewing the experience of the various towns and cities, whose water supplies have come under the observation of this Board, they are of the opinion that as a general rule where water supplies are directly under the control of those most interested in their purity, that the purity of the supply has been most carefully guarded; and that where the water supply has been either endangered or its quality deteriorated, it has been most easy to make the necessary changes, or to carry out plans for protecting the water when the supplies have been under municipal management.

Respectfully submitted,

WOOLSEY JOHNSON, *Chairman.*
ALFRED MERCER, M. D.
EDWARD M. MOORE, M. D., *President.*
ALFRED L. CARROLL, M. D., *Secretary.*

ROCHESTER, N. Y., *October* 14, 1885.

DR. A. L. CARROLL, *Secretary State Board of Health, Albany, N. Y.:*

DEAR SIR—I received from Dr. Alfred Mercer, of Syracuse, October 6th, four samples of water for analysis. The labels indicated that they had been taken at Shakelton's Point, Oneida lake, 1,000, 2,000, 3,000 and 4,000 feet from shore, at the bottom of the lake. The samples are designated below by the numbers 1, 2, 3 and 4, respectively. The analysis gives the following results:

Parts per 100,000 *by Weight.*

	No. 1.	No. 2.	No. 3.	No. 4.
Total solid residue	14.23	14.22	14.21	14.23
Chlorine	0.454	0.452	0.453	0.454
Ammonia, free	0.000	0.000	0.000	0.000
Ammonia, albuminoid	0.002	0.002	0.002	0.002

In each sample animalcula were present, of the class of entomostraca common to all our lake waters. The microscopical examination revealed a number of species of plants and animals invisible to the unaided eye, but of the same species as those found in Hemlock lake, from which this city is supplied, and in other lakes of western New York.

Both the chemical analysis and the microscopical examination show that these four samples are identical in character. The minute life is such as is common in all pure waters exposed to the air and sunlight, while the chemical analysis shows its suitability for domestic use. The solid residue — eight and a quarter grains per gallon — consists chiefly of calcium carbonate and renders the water slightly hard.

ROCHESTER, N. Y., *November* 9, 1885.

Dr. A. L. CARROLL, *Secretary State Board of Health, Albany, N. Y.:*

DEAR SIR — On the 6th inst. I received a sample of water, accompanied by a letter, from Dr. Alfred Mercer, requesting me to filtera part of the water and make separate analyses of both the filtered and the unfiltered portions. The water was clear, and a few white animalcula were the only floating objects visible to the eye. The following are the results in parts by weight for 100,000:

	Filtered.	Not filtered.
Total solid residue	14.5	14.5
Chlorine	0.45	0.45
Ammonia, free	trace	trace
Ammonia, albuminoid	0.002	0.002

The microscopic examination showed a few entomostraca and a few other minuter forms of life such as are common in the lakes of western New York.

Very respectfully,
S. A. LATTIMORE,
Analyst, S. B. H.

ANALYSIS OF ONEIDA LAKE WATER.

ALBANY MEDICAL COLLEGE, *November* 10, 1885.

Received from Dr. A. Mercer, Syracuse, N. Y., November 5, 1885:

FILTERED WATER.

(*Parts per* 100,000.)

Color and appearance	Light greenish tint.
"	Transparent.
Odor at 100 degrees F	None.
Chlorine	0.32
Free ammonia	0.0027
Albuminoid ammonia	0.0035
Total solids	16.40
Loss on ignition	5.20
Mineral matter	11.20

Conclusions.

This (filtered) water differs but little from the unfiltered. Judged by these analytical results it is of good quality, but in order to form a positive opinion as to the quality of a large body of water, numerous and more elaborate analyses should be made. The above form was adopted more particularly with a view to the examination of private supplies.

WILLIS G. TUCKER,
Analyst.

Unfiltered Water

(*Parts per* 100,000.)

Color and appearance	Light greenish tint.
"	Transparent.
Odor at 100 degrees F	None.
Chlorine	0.32
Free ammonia	0.0027
Albuminoid ammonia	0.0045
Total solids	16.80
Loss on ignition	5.20
Mineral matter	11.60

Conclusions.

The color, appearance and odor of the water are unobjectionable; chlorine is low, and free and albuminoid ammonia are low. Total solids and loss on ignition not excessive. Judged by above analytical results, the water is of good quality.

WILLIS G. TUCKER,
Analyst.

To the Sanitary Committee:

The question of the purity of the ice of Onondaga lake having been referred to me, I took occasion at the meeting of the sanitary committee on December 8th, to have a hearing of all parties interested in the matter. Ice for the use of Syracuse is furnished to several parties; Sawmiller, Knapp and others are among the ice men. The ice is cut from Onondaga lake, Oneida, Cazenovia and Cayuga lakes, and from several points on the Erie canal.

It appears that the city board of health, on the recommendation of Dr. Englehardt, forbade Messrs. Sawmiller Bros. from selling, for purposes where it comes in direct contact of food or drink, the ice cut from Onondaga lake. This firm claimed that such action was unjust, as the ice sold by them was pure, and no more subject to sanitary condemnation than much of the other ice sold in the city.

The request for an examination of the subject by the State Board of Health comes from the city board of health of Syracuse. I have already made personal examination of the sanitary condition of most of the waters flowing into this stream; such additional knowledge

as was needed I obtained from witnesses at the hearing on December 8th. The principal stream entering Onondaga lake in the city of Syracuse is Onondaga creek, into which flow all the principal sewers of the city. An examination of the condition of this stream proves that its waters are very grossly polluted.

Onondaga is a small lake and quite narrow. A large proportion of its water is derived from Onondaga creek; the ice of the creek is, therefore, open to suspicion; but no positive judgment can be made of the degree of pollution of the ice without a series of analyses of samples of ice cut from the lake at properly selected points.

Samples of the water at the points where the ice is cut should also be taken. I, therefore, advise that the committee recommend the city board of health of Syracuse to have a specimen of ice cut at the point where Onondaga creek enters the lake; another specimen two thousand feet north of this point; another two thousand feet north-west of the last point, and two more specimens within the next mile, in the direction of Liverpool, and that specimens of the water from the lake be taken at such point where the ice is cut.

The specimens should be carefully labeled when taken, to insure that the position of each is a matter of certain record. The city board of health, however, should have these samples submitted to chemical and biological analysis by the analyst of the State Board of Health, in Albany. When the results of the chemical and biological analysis are at hand, and specimens of ice and water taken in the manner above described, it will be possible to form an opinion as to the safety of using the ice from Onondaga lake, as a supply for the city of Syracuse.

JAMES T. GARDINER,
Consulting Engineer.

The sanitary committee hereby approve the report of consulting engineer Gardiner, and advise that its recommendations be adopted by the Board and transmitted to the city board of health of Syracuse.

WOOLSEY JOHNSON,
ALFRED MERCER.

At a special meeting of the State Board of Health, on the 14th January, 1886, the report of the sanitary committee on the investigation of the water supply of Syracuse was adopted.

ALFRED L. CARROLL, M. D.,
Secretary.

January 15, 1886

The Sanitary Laws of the United Kingdom of Great Britain and Ireland, also of the United States of America, and of the Important States of the Union, together with Cases Decided in both Countries on Disputed Points arising out of the Rights and Duties of Boards of Health, whether Specifically Constituted as Independent Bodies, or as forming Part of the Authority in which is Vested the Government of Cities, Towns and Villages and Rural Communities in both Countries.

By Hugh Weightman, M. A., of the University of Cambridge, England, author of "The Laws relating to the Medical Profession."

The Law of the United Kingdom of Great Britain and Ireland on the subject of the Public Health.

The doing of any act by which the public health might be endangered, whether by the propagation of an infectious disease, or by erecting any establishment which might corrupt the air by noxious exhalations, was ever a great misdemeanor at common law.

The exposing, by carrying a child infected with small-pox along a public way, near to a dwelling-house, etc., to the great danger of infecting persons there passing, is a great misdemeanor at common law. *Rex* v. *Vantandillis*, 4 Maule & Selwyn, 73.

The first act on the subject of the public health, generally, relating to England, which calls for attention is the 23 and 24 Vict., chap. 77, amending some existing acts for the removal of nuisances and the prevention of diseases, and constituting certain bodies, therein named, the local authorities to execute the Nuisance Removal Act, and repealing all former enactments constituting a local authority for the execution of the Diseases Prevention Act (except those contained in the Metropolitan Local Management Act) and directing that the board of guardians or the overseers of the poor, as the case may be, where there is no board of guardians, shall be the local authority for executing the Diseases Prevention Act, who are thereby required to provide carriages for the conveyance of infected persons suffering from contagious or infectious diseases; and two justices at petty sessions, upon proper complaint, may order the removal of a nuisance on any private premises, and the guardians of any union, or parish not within an union, may at any time employ one of their medical officers to make inquiry and report upon the sanitary state of the union or parish.

Various statutes from the time of James I had been passed dealing with the subject of the public health, but so limited in their definitions and scope that with the exception of the Metropolitan

Local Management Act, and the 23 and 24 Vict., chap. 77, together with the 29 and 30 Vict., chap. 90 (styled the Sanitary Act of 1866), no attempt was made at comprehensive legislation on this subject until the year 1875, when an act was passed (38 and 39 Vict., chap. 55), entitled "An act for consolidating and amending the acts relating to Public Health in England." By this act, nearly all former enactments were repealed, especially the whole of the 23 and 24 Vict., chap. 77, except so far as relates to the metropolis.

The act now in force (38 and 39 Vict., chap. 55), known as the Public Health Act, defines sanitary powers and duties, constitutes sanitary districts and authorities, confers special powers upon urban sanitary authorities, dissolves all former constituted districts, forms new districts with powers of local government, and creates local and special rural authorities for the purpose of carrying out its provisions.

It deals with such subjects as sewers and drains, use of sewers by manufacturers, disposal of sewage, sewage works without the district, enforcement of privy accommodation, public necessaries in urban districts, cleansing streets and houses, cleansing ditches and removal of manure, definition of nuisances, procedure for abatement of nuisances, jurisdiction as to nuisances on ships, proceedings in case of joint nuisance, leaving other remedies unaffected, offensive trades in urban districts, seizure of unsound food exposed for sale. It also regulates powers for supply of water, and deals with the pollution of streams or wells. It further bestows very summary powers for interfering with the occupation of cellar dwellings, and the regulation and inspection of not only common lodging-houses, but also of houses (not common lodging-houses) let in lodgings, with a view to the prevention of overcrowding, etc.

Provisions are also contained against infection generally, as well as in lodging-houses and canal boats. Preventive measures are directed against epidemic diseases; hospitals and medicine are provided, infected persons are to be removed to hospital, and mortuaries as well as places for *post-mortem* examinations are provided. Returns are also directed to be made to authorities as to deaths.

Sanitary districts and authorities are constituted, local boards and improvement commissioners are incorporated, the election of members of such local boards regulated, also of certain improvement commissioners, the powers and duties of urban authorities defined, also of rural authorities.

A combination of districts may be effected for the prevention of epidemics, for the execution of works, and for the appointing of medical officer of health.

The appointment of inspectors of nuisances and the auditing the accounts of officers generally is minutely provided for. Of course the authorities are clothed with all powers for making rates, and borrowing on and mortgaging the same, but the working machinery by which the financial result is arrived at need not form the subject of this paper.

Special powers are conferred upon the urban sanitary authorities to inclose, under certain circumstances, suburban commons, to establish elementary schools, for the adoption and management of highways, bridges and turnpike roads, paving and lighting streets, providing places of public recreation, regulating markets and slaughter-houses, and for making regulations as to street obstructions, fires, etc., and public bathing places.

The powers of medical officers of health and other officers are defined and an appeal given from the sanitary authority; the powers of inspectors are also defined.

The rural authority may be invested with powers of urban authority, and a port sanitary authority constituted and existing at time of passing of this act may be constituted with similar powers to those of local authorities; rural authority may make by-laws as to lodging of hop-pickers and certain local interests specified. Such appear to be the main provision of the Public Health Act for England, not including the metropolis.

Of the Public Health (Metropolis) Act (35 and 36 Vict., chap. 79) the provisions are as follows, based upon many previous acts, commencing with 18 and 19 Vict., chap. 116 (1854-5).

Under the head of Sanitary Powers and Duties.

Definition of nuisances. Notice of nuisances, power of entry and inspection. Procedure for abatement of nuisances. Cleansing and improving ditches. Periodical removal of manure. Jurisdiction as to nuisance on ships. Nuisance caused by offensive trades. Seizure of unsound food exposed for sale. Also further provisions as to drainage, smoke, offensive trades, etc., as contained in Metropolis (Management Water) Acts.

Occupation of cellar dwellings. Common lodging-houses, registration, regulation and inspection of, in Metropolitan Police District. Houses, not common lodging-houses, let in lodgings.

Provisions against infection in canal boats and otherwise. Prevention of epidemic diseases. Providing hospitals and medicine. Removal of infected persons to hospital. Providing mortuaries and places for *post-mortem* examinations.

Local Authorities. — Vestries and district boards are constituted to execute Nuisances Removal and Diseases Prevention Acts. In city of London, commissioners of sewers to execute Nuisances Removal Acts. Power is given to appoint committees, and penalty enacted for damaging property of authorities.

Port sanitary authority for port of London — Sundry powers are given to local government board as to recovery of expenses out of rates, and borrowing money on security of rates.

Much the same description of sanitary legislation has been enacted for Scotland, principally by acts 30 and 31 Vict., chap. 101; 34 and 35 Vict., chap. 38; 38 and 39 Vict., chap. 74, and 39 and 40 Vict., chap. 31 and chap. 75.

With respect to IRELAND, such legislation appears to have commenced in 1851 with an act for regulating common lodging-houses (14 and 15 Vict., chap. 28), and to have been constantly superadded to almost every subsequent session of Parliament, including the year 1876, when the Rivers Pollution Act (39 and 40 Vict., chap. 75) was passed. The powers conferred by some twenty different statutes are in most respects analogous to those conferred by the English Public Health Acts.

The Contagious Diseases Acts, relating to the medical examination, detention, harboring of, and hospitals for prostitutes, at certain military and naval stations, form an important ingredient in the public health system, especially as far as relates to the army and navy, and the localities where they are constantly stationed. Those acts are the 29 and 30 Vict., chap. 35, the 31 and 32 Vict., chap. 80, and the 32 and 33 Vict., chap. 96.

The vaccination statutes for England, Ireland and Scotland respectively are very voluminous; vaccination is made compulsory and inoculation forbidden. In the case of an illegitimate child the duty of the mother as to the vaccination of such child is defined. The act under which all former acts were consolidated, amended or partially repealed is the 30 and 31 Vict., chap. 84, and numerous intervening acts between it and 42 and 43 Vict., chap. 70, have supplemented the original provisions.

The adulteration of food and drugs is provided against by statutes extending over a period of nearly fifty years, from 6 and 7 Wm. IV, chap. 37, to 42 and 43 Vict., chap. 30, and relate to Great Britain. There has been special legislation as to Ireland from 1 and 2 Vict., chap. 28, to 41 and 42 Vict., chap. 52, and the efforts to regulate the trade in intoxicating liquors throughout the United Kingdom embraces the period from 1660 to 1876, under the statute law revision (39 and 40 Vict., chap. 20).

Additional legislation, almost from year to year up to the present time has supplemented the statute law hitherto referred to, relating to the public health. The 46 and 47 Vict., chap. 35 — the Diseases Prevention (Metropolis) Act, 1883 — gives power to the managers of any hospital, asylum or work-house to contract for reception of cholera patients subject in the case of an asylum to the consent of the local government board, and in case of a work-house subject to provisions of Metropolitan Poor Act of 1867. And vestries and district boards may borrow money for such purposes. Wharves and landing places for embarkation of patients are required to be provided and expenses authorized. Local government board shall be deemed to have assigned to port of London the powers had assigned to them.

46 and 47 Vict., chap. 37 — The Public Health Act (support of sewers), Amendment Act, 1883 — relates to construction or maintenance of any works, under the title of "Sanitary Works," of sewerage, drainage, sewage disposal, lighting or water supply, etc.; also, with respect to mines, whether the land under which such

sanitary work is situated is or is not vested in the local authority, or is or is not wholly or partially dedicated to the public, and no compensation can be demanded for any right of support required, lateral or virtual, nor on the other hand is any liability incurred by any person working mines in a reasonable manner for any damage to a sanitary work.

46 and 47 Vict., chap. 59 — Epidemic and other Diseases Prevention Act, 1883 — enables sanitary authorities in England and Ireland to borrow money for the purposes therein enumerated.

46 and 47 Vict., chap. 48, empowers the establishment of temporary cholera hospitals in Ireland.

Recent Legislation on the Subject not Previously Referred to

Powers for supply of water. 41 and 42 Vict., chap. 25, §§ 8, 10.

Power to invest urban authority with powers of rural authority. 41 and 42 Vict., chap. 25, § 11.

Houses in rural districts not to be built or rebuilt without supply of water. 41 and 42 Vict., chap. 25, § 6.

Transfer of buildings by guardians to rural authorities for use as an infectious hospital. 42 and 43 Vict., chap. 54, § 14.

Providing cemeteries. 42 and 43 Vict., chap. 31.

Cemetery without district. 42 and 43 Vict., chap. 31, § 2 (2.)

England.— General Law. 41 and 42 Vict., chap. 16, § 101.

Factories and workshops to be kept in cleanly state, ventilated and not overcrowded. § 3.

Notice by inspector to sanitary authority of neglect of sanitary provisions, and action of sanitary authority thereupon. § 4.

Factories, workshops and workplaces not subject to Factory Acts, if not kept in cleanly state, or not ventilated, or if overcrowded, to be deemed nuisances.

In the Metropolis. (E.) 41 and 42 Vict., chap. 16, § 101.

Elsewhere in England. 41 and 42 Vict., chap. 16, § 101.

In Scotland. 41 and 42 Vict., chap. 52, § 107.

In Ireland. 41 and 42 Vict., chap. 16, § 106 (11.)

Fencing of certain machinery in factories. 41 and 42 Vict., chap. 16, § 5.

Power to give notice requiring fencing of other machinery, or of dangerous vats and structures in factories or workshops, or fixing of insecure or replacing of faulty grindstones and procedure thereon. 41 and 42 Vict., chap. 16, §§ 6–8.

Restrictions on children, young persons and women cleaning machinery in motion, or working between parts of self-acting machinery. 41 and 42 Vict., chap. 16, § 9.

Period of employment, and regulations as to meal-time in cases of children, young persons and women employed in textile factories, non-textile factories and workshops. 41 and 42 Vict., chap. 16, §§ 11, 15, 17, 18.

Children and young persons belonging to same family employed in domestic factory or workshop. 41 and 42 Vict., chap. 16, § 16.

Fixing and notice of period of employment, meal-times, and mode of employment of children. 41 and 42 Vict., chap. 16, § 19.

Prohibition of employment of children under ten. 41 and 42 Vict., chap. 16, § 20.

Prohibition of employment of children, young persons and women on Sunday. 41 and 42 Vict., chap. 16, § 21.

Holidays and half holidays in factories and workshops. 41 and 42 Vict., chap. 16, § 22.

Children or young persons under sixteen not to be employed in factories without certificate of fitness; regulations as to certificates. 41 and 42 Vict., chap. 16, § 27.

Power to occupiers of workshops to obtain certificates of fitness, etc. 41 and 42 Vict., chap. 16, § 28.

Power of inspector to require discontinuance of employment of child or young person, as incapacitated, production of surgical certificate of capacity. 41 and 42 Vict., chap. 16, § 29.

Further provisions as to certificates of fitness; power of inspectors to annul certificates in certain cases. 41 and 42 Vict., chap. 16, § 30.

Notice to inspector and certifying surgeon of accidents causing death or bodily injury; investigation and report by surgeon. 41 and 42 Vict., chap. 16, §§ 31, 32.

SPECIAL PROVISIONS.

Limewashing and washing of factories and workshops. 41 and 42 Vict., chap. 16, § 33.

Painting, washing and limewashing of bake-houses. 41 and 42 Vict., chap. 16, § 34.

Restrictions on use of rooms in bake-houses for sleeping places. 41 and 42 Vict., chap. 16, § 35.

Ventilation by fan in certain factories and workshops. 41 and 42 Vict., chap. 16, § 36.

Protection of children, etc., employed in web spinning. 41 and 42 Vict., chap. 16, § 37.

Prohibition of employment of children or young persons in certain factories and workshops. 41 and 42 Vict., chap. 16, § 38, sch. I.

Prohibition of taking meals or remaining during meal-time in certain factories, etc.; power to extend prohibition to other factories, etc., by order of Secretary of State. 41 and 42 Vict., chap. 16, § 39, sch. II.

Period of employment and times for meals in printworks and bleaching and dyeing works. 41 and 42 Vict., chap. 16, § 40.

Power to extend to classes of workshops, prohibition of employment of children and young persons under sixteen, in factories without certificate of fitness. 41 and 42 Vict., chap. 16, § 41.

Public Health Act, 1875 (38 and 39 Vict., chap. 55), repeals

The whole of 11 and 12 Vict., chap. 63. P. H. A., 1848, common lodging-house, Ireland.

The whole of 14 and 15 Vict., chap. 28. C. L. H. Act, 1851, except as far as relates to M. P. D.

The whole of 16 and 17 Vict., chap. 41. C. L. H. Act, 1853, except as above.

The whole of 18 and 19 Vict., chap. 116. Diseases Prevention Act, 1855, except so far as relates to the Metropolis.

The whole of 18 and 19 Vict., chap. 121. Nuisance Removal Act for England, 1885, except as above.

The whole of 21 and 22 Vict., chap. 98. Local Government Act, 1858.

The whole of 23 and 24 Vict., chap. 77. Act to amend Acts for Removal of Nuisances and Prevention of Diseases, except as above.

The whole of 24 and 25 Vict., chap. 61. Local Government Act, 1858; Amendment Act, 1861.

The whole of 26 and 27 Vict., chap. 17. Local Government Act; Amendment Act, 1863.

The whole of 26 and 27 Vict., chap. 117. Nuisances Removal Act for England; Amendment Act, 1863, except as above.

The whole of 28 and 29 Vict., chap. 75. Sewage Utilization Act, 1865, except as far as relates to Scotland and Ireland.

The whole of 29 and 30 Vict., chap. 41. Nuisances Removal Act (No. 1), 1866, the whole act except as relates to Metropolis.

29 and 30 Vict., chap. 90. The Sanitary Act, 1866; parts I, II, and III, except so far as relates to Metropolis, or to Scotland or Ireland.

The whole of 30 and 31 Vict., chap. 113. Sewage Utilization Act, 1867, except so far as relates to Scotland or Ireland.

The whole of 31 and 32 Vict., chap. 115. Sanitary Act, 1868, except as far as relates to Metropolis.

The whole of 32 and 33 Vict., chap. 100. Sanitary Loans Act, 1869, except as above.

The whole of 33 and 34 Vict., chap. 53. Sanitary Act, 1870, except as above.

The whole of 35 and 36 Vict., chap. 79. Public Health Act, 1872, except as above.

The whole of 37 and 38 Vict., chap. 89. Sanitary Law Amendment Act, 1874, except so far as relates to the Metropolis or the Metropolitan Police District.

Of the above acts, the following, namely: 'The Public Health Act, 1848,' and 'The Local Government Act, 1858,' and 'The Local Government Act, (1858) Amendment Act, 1861,' and 'The Local Government Act, Amendment Act, 1863,' are in this act (38 and 39 Vict., chap. 55), referred to as 'The Local Government Acts.'

At an election for a member of a local board, V. and M. were the only candidates; M. was declared to be elected, he having obtained 94 votes, and V. 89. V., without the consent of the Attorney-General, preferred an information under the P. H. Act (1875), Schedule II, R. 69, against W., charging him with fabricating in part the voting paper of D., a person entitled to three votes at the election; but

the justices dismissed it on the ground that V. was not a "party aggrieved" within the P. H. Act, 1875, § 253, and therefore that the consent of the Attorney-General was necessary. *Held*, that the dismissal of the information was wrong within the meaning of that statute. *Verdin* v. *Wray*, 2 L. R. Q. B. Div. 608; 25 W. R. 274; 46 L. J. Q B. Div. 170; 35 L. T. (N. S.) 942.

Generally.—Where a local board of works attempted to exercise their arbitrary powers without leaving to a person affected thereby the right of appeal given by the act, the Court of Chancery restrained them by injunction from so doing, until the question should be determined by the proper tribunal. *Tinkler* v. *Wandsworth District Board of Works*, 1 Giff. 412; affirmed on appeal, 2 DeG. & J. 261.

Where there is a doubt whether the arbitrary powers given to local boards are properly exercised it is the duty of the court to take care that the checks appointed by the Legislature have the operation in favor of the persons affected. *Ib.* Where a board constituted by an act of Parliament is authorized by it to delegate any of its powers to a committee, the powers so conferred upon the committee must be exercised by them acting in concert; and it is not competent to the committee to apportion among themselves the duties so delegated to them; and one of them acting alone, pursuant to such appointment, cannot justify his acts under the act of Parliament. *Cook* v. *Ward*, 2 L. R. C. P. Div. 255; 25 W. R. 593; 37 L. T. (N. S.) 893; C. A. affirming judgment of the C. P. Div.; 25 W. R. 350; 46 L. J. C. P. Div. 554.

A board having statutory power to consent in writing to a particular act is not bound by tacit acquiescence. *Ib.*

A provisional order of a Secretary of State empowering a local board of health to put in force the power of the Land Clauses Act of 1845 (8 and 9 Vict., chap. 18) with respect to the purchase of lands otherwise than by agreement, is nothing more than a substitution for proceedings before a standing orders committee, and has no force or validity until confirmed by act of Parliament, and cannot be brought up by *certiorari* for the purpose of being quashed. *Frewer* v. *Hastings Local Board of Health*, 11 Jur. (N. S.) 670; 34 L. J. Q. B. 159; 13 W. R. 678; 12 L. T. (N. S.) 346.

A corporation being, as the sanitary authority of a city, duly empowered to take lands specified in the schedule to its provisional order, for the purpose of public improvements, served notice to treat upon the trustees of a charity, who were the owners of the lands. The lands comprised in the notice were more than were actually required for the purpose of the work. *Held*, that the cases deciding that a railway company cannot take compulsorily more land than is actually required for its works did not apply to a corporation taking lands for public improvements, and that the corporation was entitled to take compulsorily the whole of the land comprised in the notice. *Quinton* v. *Bristol* (*Mayor, etc.*), 43 L. J. Ch. 783; 22 W. R. 434; 17 L. R. Eq. 523, V. C. M.

Where a local act required the consent of commissioners to new streets becoming highways to make the inhabitants liable to repair them, an order of the local board on owners to repair a street in respect of which such consent had not been given, is lawful inasmuch as such street was not a highway repairable by the inhabitants at large. *Willis* v. *Wallingtom*, 13 C. B. (N. S.) 865; 32 L. J. C. P. 86, Exch. Cham.

Under 11 and 12 Vict., chap. 63, § 55 (repealed by 21 and 22 Vict., chap. 98, §§ 32, 33) local boards of health have no general power to make by-laws for carrying out the purposes of the act, but only such by-laws as are authorized by section 55. *Reg.* v. *Wood*, 5 El. & Bl. 49; 3 C. L. R. 1134; S. C., *nom. Reg.* v. *Rose*, 1 Jur. (N. S.) 802; 24 L. J. M. C. 130.

A by-law, "that all occupiers of any premises within the district shall properly clean and remove all snow, or other obstructions, from the foot-path and channel opposite their respective premises, before nine of the clock in the forenoon of each day," was bad. *Ib.*

An information having been laid against an occupier under this by-law, and it being proved that the occupier had neglected to remove snow, it was objected that the by-law was bad; but the justice held that, inasmuch as it had been allowed by the Secretary of State, he could not entertain the objection; and he convicted the occupier. The court quashed the conviction on *certiorari*, though section 137 enacts, that no proceeding touching the conviction of any offender against the act shall be removable by *certiorari*, holding that the justice acted without jurisdiction. *Ib.*

A local board of health gave notice under 11 and 12 Vict., chap. 63, § 69, to the owner of a house abutting on a street, to level and pave it, and, in default of the owner, they did the work themselves. By the alteration so caused in the level of the street, the access to the house was rendered difficult and dangerous. *Held*, that the owner was entitled to compensation under section 144. *Reg.* v. *Wallasey Local Board of Health*, 4 L. R. Q. B. 351; 10 B. & S. 428; 38 L. J. Q. B. 217; 17 W. R. 766; 21 L. T. (N. S.) 90.

The Manchester Improvement Act (1851) enacts in section 17, that the expenses incurred by the town council in sewering and flagging a street shall be borne by the owners, "according to the extent of their respective houses and grounds lying alongside or adjoining to the said street." *Held*, that the owner of the ground at the end of a street forming a *cul de sac* was liable under this section, although a wall divided his property entirely from the street. *Manchester* (*Mayor, etc.*) v. *Chapman*, 18 L. T. (N. S.) 640; 16 W. R. 974; 37 L. J. M. C. 173, C. P.

By 11 and 12 Vict., chap. 63, § 69, and 15 and 16 Vict., chap. 42, § 13, a local board may require the owners of the houses in a street, not being a highway repairable by the inhabitants at large, to sewer, level and pave it, and in default of the owners the board may do the work, and the expenses are to be paid by the owners in proportion to their frontage, the proportion to be settled by the

surveyor, and in case of dispute, by arbitration; and by 21 and 22 Vict., chap. 98, § 63 (repealed by 38 and 39 Vict., chap. 55), the apportionment of the surveyor shall be binding and conclusive upon every owner, unless within three months from the notice of the amount of the proportion, he shall, by written notice, dispute the same. A local board having duly proceeded under the act, and sewered, leveled and paved a street, and no notice having been given by an owner that he disputed the apportionment, the board sought to enforce before justices the payment of the proportion charged. *Held*, that it was still open to the owner to dispute his liability, and to show that the street was a highway repairable by the inhabitants at large. *Hesketh* v. *Atherton Local Board*, 9 L. R. Q. B. 4; 43 L. J. M. C. 37. The owner upon whom notice to level, etc., under 11 and 12 Vict., chap. 63, § 69, and 26 and 27 Vict., chap. 70, § 3, has been served, and who has not given notice of objection, is estopped from showing that the street in question is a highway repairable by the inhabitants at large. *Reg.* v. *Linesey*, 2 L. T. (N. S.) 470, Q. B.

The word "street" in the Towns Police Clauses Act, 1847, and the Public Health Act, 1848 (the latter repealed), means a place to which the public have a right of access, and does not include a spot from which the public may be shut out by the owner of the soil. *Curtis* v. *Embery*, 7 L. R. Exch. 369; 21 W. R. 143, Exch.

A piece of ground dedicated by user to the public as a road is not a "street, not being a highway" within the Public Health Act, 1848, § 69 (since repealed). *Healey* v. *Batley* (*Corporation*), 44 L. J. Ch. 642, V. C. B.

A corporation, affecting to act under the provisions of their local act, commenced to break up and excavate a private road belonging to the plaintiff, and situate within the borough, for the purpose of laying down a sewer. *Held*, that on the construction of the local act, taken with the provisions contained in the Public Health Act, 1848, the Sewage Utilization Act, 1865, 28 and 29 Vict., chap. 75, and the Public Health Act, 1875 (by which latter act the first is wholly repealed, and the second except so far as relates to Scotland and Ireland), the road was a street within those acts, and that the corporation had power to lay down the sewer thereunder and for that purpose to break up the soil thereof. *Taylor* v. *Oldham Corporation*, 25 W. R. 178; L. R. Ch. Div. 395; 25 L. T. (N. S.) 696; 46 L. J. Ch. Div. 105, R.

When premises have been provided for the purpose of being used as public walks or pleasure grounds, under the Public Health Act, 1848, 11 and 12 Vict., chap. 63, § 74, it is allowable to erect thereon such buildings as may be conducive to the purpose for which the premises have been required. Of such a nature are a conservatory, a museum and a public library, but not a town hall or a school of art. *Attorney-General* v. *Sunderland* (*Corporation*), 45 L. J. Ch. 839; 24 W. R. 991; 2 L. R. Ch. Div. 634, C. A. Although the above act is repealed, the principle remains the same wherever such a power as above is given.

By section 326 (Part XI, saving clauses and repeal of acts) of 38 and 39 Vict., chap. 55, Public Health Act, 1875, "All urban sanitary authorities and rural sanitary authorities existing at the time of the passing of this act shall be deemed to be urban authorities and rural authorities under this act; and all joint boards, port sanitary authorities, and parochial committees, and all local government districts constituted in pursuance of the Sanitary Acts, and existing at the time of the passing of this act, shall be deemed to be joint boards, port sanitary authorities, committees of rural sanitary authorities, and parochial committees, and local government districts, under this act; and the members of all the above-mentioned bodies shall hold office (subject to the provisions of this act respecting the election of members of local boards) for such time as they would respectively have held office if this act had not been passed; and the officers and servants of all the above-mentioned bodies shall continue to hold their several offices and employments on the same terms and subject to the same conditions as to duties, remuneration and otherwise, as they would have held them if this act had not been passed; and all by-laws duly made under *any of the Sanitary Acts* by this act repealed and not inconsistent with any of the provisions of this act, shall apply to all such bodies existing at the time of the passing of this act, and to their several officers and servants, in substitution for the provisions of the Sanitary Acts by this act repealed, but so as not to affect any right acquired or liability incurred under the Sanitary Acts, or any of them, before the passing of this act, and existing at the time of the passing of this act." Except where cases have been decided since the passing of the act of 1875, unless they involve general principles necessarily recognizable independent of statutory enactment, it has been thought better not to complicate the subject with decisions which might be affected by the subsequent legislation, which of itself has yet to be further tested, as some misapprehension might thus arise inadvertently. The difficult question of effectually legislating for the public health has been of too serious and intricate a character to justify the reproduction of decisions on repealed statutes except where they have been ratified by subsequent decisions in consonance with the more recent enactments.

Roads and Other Highways.

By 15 and 16 Vict., chap. 42, § 13, the term "highway" in sections 68 and 69 of 11 and 12 Vict., chap. 63, shall mean any highway repairable by the inhabitants at large. See *Kingston-upon-Hull Local Board of Health* v. *Janes*, 2 Jur. (N. S.) 1193.

Sewers.

A local board of health has no power to enter upon land without the consent of the owner, for the purpose of making reservoirs and deposit beds for retaining the sewage. *Sutton* v. *Norwich* (*Mayor, etc.*), 27 L. J. Chanc. 739, V. C. K.

A local board of health is not justified in polluting the surface water which flows by an open gutter into a canal, by diverting it into a sewer, and passing the sewage into it. *Manchester, Sheffield & Lincolnshire Railway Company* v. *Worksop Board of Health*, 23 Beav. 198; 3 Jur. (N. S.) 304; 26 L. J. Chanc. 345.

Where a canal company had a statutory power to supply the canal with water, out of such "brooks, streams and water-courses as should be found within a certain distance," *held*, that it would be difficult to hold that the mere surface water of a road, not arising from any spring, or natural certain supply, could fall within the act, so far and to such an extent as to exclude a local board of health from making a system of drainage essential to the district, which offending against the right of no one in any other particular, merely allowed to flow, through gratings into the sewer, the water collected on a public road, from rain and from the overflowing of the surplus of the neighboring houses, which water had theretofore flowed down an open gutter into a canal. *Ib.*

By direction of a local board of health the sewage of a town had been by means of drainage conveyed to a river, which sewage, not having been completely deodorized before coming in contact with the river, had so polluted the stream passing B.'s property, as to kill the fish therein, and otherwise cause a nuisance. *Held*, that B. was entitled to an injunction to restrain the further pollution of the water passing by his property. *Bidder* v. *Croydon Local Board of Health*, 6 L. T. (N. S.) 778, V. C. W.

A by-law made by a local board, which provides that if any owner or person should construct, or cause to be constructed any works, or do any act [or omit to do any act, or comply with any], requirement of the local board, or should make any alterations in any works after they have been completed, whether in new or existing buildings, contrary to the provisions therein contained, the local board might cause such works to be removed, altered or pulled down, is invalid, as exceeding the powers conferred by 21 and 22 Vict., chap. 98, § 34 (now repealed). *Brown* v. *Holyhead Local Board of Health*, 1 H. & C. 601; 32 L. J. Exch. 25.

A by-law by a local board of health, imposing continuing penalties on any person who shall construct any works, or do, or omit to do any act, or to comply with any requirements of the board, or shall make any alteration or deviation in any plan approved by the board, whether in new or existing buildings, contrary to the provisions therein contained, or shall do any act, matter, or thing contrary to the by-laws made under the authority of the 21 and 22 Vict., chap. 98, § 34 (since repealed), or shall omit, neglect, or fail to perform any of the works, matters, or things required by such by-laws, and empowering the board to remove, alter, pull down, or otherwise deal with such work as the case may require, is invalid, as exceeding the authority given by the 21 and 22 Vict., chap. 98. *Young* v. *Edwards*, 33 L. J. M. C. 227; 11 L. T. (N. S.) 424, Exch.

But see *Hall* v. *Nixon*, 10 L. R. Q. B. 152; 44 L. J. M. C. 51, 55; 32 L. T. (N. S.) 87; 23 W. R. 612.

If a person gives notice of his intention to build, and leaves with the local board plans and sections, he may at once commence the building subject to the right of its being altered or pulled down, if not in conformity with the by-laws of the board. *Ib.*; and *Hattersley* v. *Barr*, 12 Jur. (N. S.) 894; 14 W. R. 864; 14 L. T. (N. S.) 565; 4 H. & C. 523.

A by-law made by a local board of health, that no dwelling-house should be erected without having at the rear, or side, a sufficient roadway for the purpose of affording efficient means of access to the privy or ash-pit belonging to the house, is bad, as beyond the jurisdiction conferred by the act. *Waite* v. *Garston Board of Health*, 17 L. T. (N. S.) 201; 16 W. R. 78; 3 L. R. Q. B. 5; 37 L. J. M. C. 19.

Section 99 of the Kingston-upon-Hull Improvement Act of 1854, enacts that every house to be thereafter constructed on vacant ground (except corner houses, etc.) shall have a back yard, or other vacant ground and area, of not less than eight feet, extending from the main building for the whole length of such building; and by section 101, a plan shall be furnished to the local board of health by persons intending to build, showing the particulars required by that act; and the building shall not be commenced until the local board approve the plan. A builder submitted to the local board of health of the borough of Kingston-upon-Hull a plan of four new houses (not corner houses) having vacant ground at the side, but not at the back. The local board disapproved the plan, as not complying with section 99, but the party commenced to build notwithstanding. *Held*, that whether section 99 required the vacant space to be at the back or not, the party was rightly convicted of an offense against section 101. *Pearson* v. *Kingston-upon-Hull Local Board of Health*, 3 H. & C. 921; 35 L. J. M. C. 36; 13 L. T. (N. S.) 180.

Section 97 enacts, that any building after the commencement of the act built, shall not, without the previous consent of the local board, be used as a dwelling-house, except only during such time as there is adjoining or belonging thereto, or occupied therewith, either a street or clear open space in and to the full extent of the front thereof, and of not less than twenty-feet in width. *Held*, that a party had committed an offense under this section in building and causing to be used, without the consent of the local board, a dwelling-house with an open space in front less than twenty feet in width. *Ib.*

Section 103 enacts that if any sewer, drain, privy, cesspool, ash-pit, building or other work be made or suffered to continue, contrary to any of the provisions of this act, * * * every person so offending shall for every such offense forfeit a sum not exceeding £5, and for every day after the first during which the offense continues, a sum not exceeding 10*s*. *Held* (by reference to the sections preceding), that the word "building" is not restricted to a building, of similar description with the class of buildings previously enu-

merated in the section, but includes a dwelling-house; and that the commencing a building, within section 101, is the making a building, within section 103. *Ib.*

Held, also, that the user of a dwelling-house contrary to section 97 is not the making or suffering it to continue contrary to the act, within section 103. *Ib.*

A medical officer of health reported under the Artisans and Laborers' Dwellings Act, 1868, 31 and 32 Vict. chap., 130, §§ 5 and 6, that the premises in Marsh's Court, in the parish of St. George the Martyr, Nos. 1 to 12 and 13, were in a condition or state injurious to health, so as to be unfit for human habitation; and upon this report the surveyor reported that he had surveyed the premises, and was of opinion that the causes of the evil were structural defects in the premises, and that such defects could not be remedied by structural alterations or improvements, or otherwise, but such premises ought to be demolished. The whole of the premises belonged to one party. The vestry subsequently made an order that the premises should be wholly demolished. *Held*, that, first, it was not necessary that there should be a report and an order in respect of each house, but that one report and one order were, under the circumstances, sufficient. *Flight* v. *St. George the Martyr* (*Southwark Vestry*), 24 L. T. (N. S.) 24, Q. B. *Held* secondly, that as the report of the surveyor stated that the structural defects could not be remedied, but that the premises ought to be demolished, it was unnecessary to specify in detail in what the structural defects consisted. *Ib.*

MARKETS.

A corporation, being lords of a market and owners of the soil, is entitled at common law to remove the market; but where the corporation, acting as a local board, takes steps under the enactment of the Local Government Act, 1858, 21 and 22 Vict., chap. 98, § 34, to set up a market in a new place, it can only act under the powers and subject to the provisos of the statute, and is not entitled to fall back on its common-law right. *Ellis* v. *Bridgeworth* (*Corporation*), 2 Johns. & H. 67; 9 W. R. 331; 4 L. T. (N. S.) 112.

Quære, whether the immemorial privilege of householders of erecting and hiring out stalls in front of houses in market place is a right protected by the proviso in section 50.

Semble, that the setting up of a new market under this statute, at a short distance from and in lieu of an ancient market, is an establishment of a market, within section 50, and not a mere removal. *Ib.*

By 26 and 27 Vict., chap. 32, the owner of any coals brought within the district of the local board of health for Hull is bound, "before such coal, or any part thereof, is sold or delivered or dealt within the district," to deliver to the inspector appointed for the purpose, the original pit note denoting the quantity and quality thereof. A

ship-owner brought coals in a lighter into the district of the board of health for Hull, where they were transferred into a steamer, also belonging to the ship-owner. *Held*, that this was dealing with the coals within the meaning of the statute, and that the ship-owner was bound to deliver the pit note to the inspector. *Wilson* v. *Hull Local Board of Health*, 12 Jur. (N. S.) 706, Q. B. A Local Improvement Act imposed a penalty for exposing for sale in any of the streets of the town any meat so as to project over or upon any foot or carriageway.

The act provided that no person should be subject to any penalty for placing any stall, or exposing provisions for sale so as such stalls shall be placed in such part of the streets as should be appointed by the commissioners, and that no person should be subject to any penalty for placing any stall or exposing provisions for sale in such parts of the streets as should have been theretofore used for that purpose at the times of the usual fairs and markets within the town.

In 1853, a local board of health was constituted in the township, under 16 and 17 Vict., chap. 24, who, by by-laws duly allowed and published, appointed certain places for markets for certain descriptions of goods on market days, and imposed penalties for the breach thereof. *Held*, that the provisions of the local act did not exempt from such penalties one who violated these by-laws by exposing for sale meat at a place other than that so appointed by the local board of health, notwithstanding the spot where such meat was so exposed for sale was a place where such articles had for a long series of years been sold by him and others. *Savage* v. *Brook*, 15 C. B. (N. S.) 264; 10 Jur. (N. S.) 587; 33 L. J. M. C. 42; 12 W. R. 81; 9 L. T. (N. S.) 334.

A local board acting under the powers of the Local Government Act, 21 and 22 Vict., chap. 98, and the Markets and Fairs Clauses Act, 10 and 11 Vict., chap. 14, made by-laws, directing that cattle markets and an annual show of horses should be held in prescribed places, and appointing a toll for cattle, horses, etc., exposed for sale in such markets. An auctioneer, at the time when these markets were established, was possessed of a building called the Agricultural Hall, which was erected some years before the passing of the by-laws regulating the market. It was a large building, containing a ring or area in which was accommodation for about 100 head of cattle. Adjoining to and communicating with it was a yard with pens capable of holding 1,400 sheep. His dwelling-house was separated from the Agricultural Hall by his harness-room and stable. He advertised and held sales by auction in the Agricultural Hall on market days, the average sale on these days amounting to 100 cattle and 1,000 sheep, and exceeding the sales in the regular market. The cattle and sheep so sold were the property of farmers and others, the auctioneer charging them with a commission. *Held*, that, without expressing any opinion whether an auctioneer would have been at liberty to sell horses by auction on his premises, notwithstanding the market, it was evident, having regard to the nature

and extent of his premises, that they were not part of his dwelling place or shop within the meaning of the 10 and 11 Vict., chap. 14, § 13, and that the business carried on by him was not a right, power or privilege which he enjoyed when the market was established, within the meaning of the Local Government Act (§ 50). *Fearon* v. *Mitchell*, 41 L. J. M. C. 170; 7 L. R. Q. B. 690; 27 L. T. (N. S.) 33.

SLAUGHTER-HOUSES, OFFENSIVE TRADES AND NUISANCES.

A police act empowered a town council of a borough to grant licenses for the erection of slaughter-houses. A. applied for a license. The market committee inspected the site and recommended the grant. The committee passed a resolution to grant the license, and communicated the same to A., and the resolution was confirmed by the town council. *Held*, that though it was usual afterward to grant a formal license in a printed form, still the grant was complete on the confirmation of the resolution and communication thereof to A., and operated as a license. *Howarth* v. *Manchester* (*Mayor, etc.*), 6 L. T. (N. S.) 683, Q. B.

By 11 and 12 Vict., chap. 63, § 64 (the whole act since repealed) the business of a slaughterer of cattle, or other noxious or offensive business, shall not be newly established in any building or place in any district, after the act has been applied to it, without the consent of the local board of health; and whosoever offends against this enactment shall be liable, for each offense, to a penalty of £50. A cattle market company, cattle having never been slaughtered in the market before, after the act had been applied to the district, erected a building, in which they allowed persons to slaughter cattle on the payment of 2*s.* a head, the company finding the tackle attached to the building, but the persons slaughtering bringing their own implements. *Held*, that the company was liable to the penalty. *Liverpool New Cattle Market Company* v. *Hodson*, 2 L. R. Q. B. 131; 8 B. & S. 184; 36 L. J. M. C. 30; 15 W. R. 563; 15 L. T. (N. S.) 534.

The Towns Improvement Clauses Act, 10 and 11 Vict., chap. 34, § 126, prohibits the use of a slaughter-house without the license of the commissioners; that is, in certain boroughs the corporation, acting as the local board, under 21 and 22 Vict., chap. 98. The corporation was the local board in Brecon. The Brecon Markets Act, 1862, which incorporated the Brecon Markets Company, empowered the company, with the consent of the corporation, to erect slaughter-houses. *Held*, that the consent of the corporation under the latter act operated as the license of the local board under the former act. *Anthony* v. *Brecon Markets Company*, 21 W. R. 27; 26 L. T. (N. S.) 979; 7 L. R. Exch. 399, Exch. Cham.; reversing 2 L. R. Exch. 168; 36 L. J. Exch. 113; 15 L. T. (N. S.) 665; 15 W. R. 620.

Prior to the coming into operation in a town of the 31 and 32 Vict., chap. 98, S. occupied premises in a street there for the pur-

pose of slaughtering pigs. These premises consisted of a yard with an entrance by closed doors or gates from the street, and in the yard, pig-pens, a cart-shed, a shed used for slaughtering pigs, and a stable for horses, the external vaults of which constituted the walls of the building. While the premises were so used S., upon the coming into operation of the act, obtained a license, which license stated that the animals to be slaughtered were pigs. No animals before them were ever slaughtered in the stable. After obtaining such license S. had converted the stable into another slaughtering shed, and used the same for slaughtering bullocks and sheep therein. Upon an information for using this stable as a slaughter-house without having obtained a license for that purpose, the justices held that upon a proper application of the law to the facts, S. was entitled to use the stable as he did, for that the stable, as forming an original portion of the premises licensed as a slaughter-house, was covered by such license. *Held*, that the justices were right. *Brighton Local Board of Health* v. *Stenning*, 15 L. T. (N. S.) 567, Q. B.

Brickmaking is not necessarily a noxious or offensive business, trade or manufacture, within 11 and 12 Vict, chap. 63, § 64 (repealed). *Wanstead Board of Health* v. *Hill*, 13 C. B. (N. S.) 479; 9 Jur. (N. S.) 972; 32 L. J. M. C. 135; 11 W. R. 368; 7 L. T. (N. S.) 744.

Proceedings to Compel Owners to do Works Required.

Land had been conveyed to three trustees, under 4 and 5 Vict., chap. 38, § 2, for the purposes of the act, and to permit the premises and all buildings erected thereon to be forever used as a school for the education of poor children, and for the residence of the master and mistress, and for no other purpose whatsoever. The school was built and used according to the trust, no rent whatever being received by the trustees. The local board gave the proper notices for paving the street, along which the school fronted, to one of the trustees and the owners of other premises fronting the street, under 11 and 12 Vict., chap. 63, § 69; and they charged the trustee, as owner of the school, the proportion according to the frontage of the school. *Held*, that the trustee was the owner within section 2, which enacts that "owner" "shall mean the person for the time being, receiving the rack-rent of the lands or premises, whether on his own account or as agent or trustee for any other person, or who would so receive the same if such lands or premises were let at a rack-rent;" and that he was, therefore, liable to pay the proportion of the expenses. *Bowditch* v. *Wakefield Board of Health*, 6 L. R. Q. B. 567; 40 L. J. M. C. 214; 25 L. T. (N. S.) 88.

A nuisance arose from a privy in the upper part of a house, of which, with the shop belonging thereto, H. was the lessee, at a rack-rent, for twenty-one years. H. occupied the shop only, and sublet the upper part, where the nuisance arose, to K., a weekly tenant, and to this part of the premises H. had no access. C., as agent to H.'s lessor, collected the rent. The parish authorities, for the pur-

pose of abating the nuisance, under the powers given them by 29 and 30 Vict., chap. 90, § 21, and 18 and 19 Vict., chap. 121, § 12, summoned C., as the owner of the premises within the interpretation clause (§ 2) of the latter statute, before the justices, who made an order upon him to abate the nuisance. *Held*, that C. was not the owner within the true construction of section 2, as K., the weekly tenant, was the occupier of the premises where the nuisance arose, and that, therefore, H. was not the occupier, but the person receiving rent from the occupier of the property within the meaning of the statutes. *Reg.* v. *Bath (Justices); Cook* v. *Montague*, 20 W. R. 624, Q. B.

By an order of justices under the Public Health Act, 1875, §§ 94, 96, it was found that on land, the property of a certain person named, a nuisance existed, viz., a foul ditch, caused by refuse water and offensive liquid from an adjoining brewery, and that this nuisance was caused by the act or default of the defendant as owner and occupier of the brewery, and it was ordered that the defendant, within three months, should abate the nuisance, and for that purpose should execute such works and do all such things as might be necessary, so that the same should no longer be a nuisance or injurious to health. Upon a rule for *certiorari*, on the ground that the defendant was not the occupier of the premises on which the nuisance was proved to exist, and that he had no power or authority from the owner to enter on the premises for any purpose whatever, *held*, that the order must be quashed. *Reg.* v. *Trimble*, 36 L. T. (N. S.) 508, Q. B. Div.

The power of justices to grant or refuse an order enabling a local authority to enter lands under section 305 of the Public Health Act, 1875, is wholly discretionary, their decision being, therefore, final. *Diss. Urban Sanitary Authority* v. *Aldrich*, 36 L. T. (N. S.) 663; 2 L. R. Q. B. Div. 179; 46 L. J. M. C. 183. A. applied to the justices under section 305 of the Public Health Act, for an order authorizing them, as the local authority, to enter upon certain lands of the defendant for the purposes of the act. The application was dismissed, but the justices stated a case under the 20 and 21 Vict., chap. 43, § 2, for the opinion of the court. *Held*, that the justices had no power to state a case, as this was not the determination of a complaint within 20 and 21 Vict., chap. 43, § 2. *Ib.*

The Public Health Act, 1875, 38 and 39 Vict., chap. 55, gives an appeal to quarter sessions in respect of any order, conviction, judgment or determination of any court of summary jurisdiction, subject to the condition that the appellant shall, within fourteen days after the cause of appeal has arisen, give notice to the other party of his intention to appeal. An order was made upon the appellants, under section 48, which order was eighteen days afterward served upon them; and they, within eight days from the receipt of the service, gave notice of appeal. *Held*, that the notice of appeal was too late. The words "cause of appeal" in section 269, subs. 2, have the same meaning as "decision of the court" in section

269, subs. 1; and a notice of an appeal against an order made under section 48 must be given within fourteen days from the time when the court pronounces its decision. *Reg* v. *Barnett Rural Sanitary Authority*, 45 L. J. M. C. 105; 1 L. R. Q. B. Div. 558; 35 L. T. (N. S.) 362.

Apportionment on and Recovery from Owners of Expenses of Works.

A street being out of repair, a local board of health gave notice to the owners of the adjoining houses to repair it, and on this not being complied with, executed the works, and gave notice of the expenses and apportionment to each of the owners. The owners gave notice of disputing the apportionment, and at the end of the three months limited by 21 and 22 Vict., chap. 98, § 63 (since repealed), the board made a demand of the amount. The owners having refused to pay, and the expenses not having been declared to be private improvement expenses. — *Held*, that the board had, under 11 and 12 Vict., chap. 43, § 11, six months from the expiration of the three months during which the apportionment might have been disputed, to take proceedings before justices of the peace for the recovery of the amount. *Jacomb* v. *Dodgson*, 3 B. & S. 461; 9 Jur. (N. S.) 848; 32 L. J. M. C. 113; 11 W. R. 308; 7 L. T. (N. S.) 674.

The 11 and 12 Vict., chap. 63 (since repealed), only authorizes an arbitration in respect of the proportion to be borne by a defaulting owner, and not in respect of any question as to the expenses being reasonable or properly incurred by the board. *Bagley* v. *Wilkinson*, 16 C. B. (N. S.) 161; 10 Jur. (N. S.) 726; 33 L. J. M. C. 161; 10 L. T. (N. S.) 543.

In 1858 a local board of health served upon W., an owner of premises within the meaning of 11 and 12 Vict., chap. 63, § 69, a notice to execute certain specified works in paving, etc.

The works not having been executed by him, the local board completed them on the 30th of November, 1860, and on the 21st of January, 1861, apportioned the expense among W. and the other owners, giving notice on the same day to him that "unless the amount of this account is paid within fourteen days after delivery, interest at the rate of £5 per cent per annum will be charged thereon until fully liquidated. To proportion of sewering, leveling, paving, flagging, channeling, etc., namely fifty feet frontage, at 5*s.* 4*d.*, £13 6 8." The amount was not paid, and the local board on the 25th of August, 1870, resolved and declared that the amount should be "private improvement expenses," and subsequently that the amount should be paid by two installments. W. refused to pay, and an information was laid against him. *Held*, that the local board, having elected in 1861 to treat the amount as a debt due from W., could not treat it as a private improvement expense. *Wilson* v. *Bolton* (*Mayor, etc.*), 41 L. J. M. C. 4; 7 L. R. Q. B. 105; 25 L. T. (N. S.) 597.

Held, also, that to recover the amount from W. proceedings must

have been taken within nine months from the service of the notice of the 21st of January, 1861, which must be considered as a demand. *Ib.*

The lessee of a house which was demised for twenty-one years at an annual rent covenanted with his lessor during the term "to bear, pay and discharge the sewers rate, tithes, rent-charge in lieu of tithes, and all other taxes, rates of assessments and outgoings whatsoever, which at any time or times during the demise should be taxed, rated, charged, assessed or imposed upon the demised premises, or any part thereof, or upon the landlord or tenant in respect thereof, or on the rent thereby reserved (except as aforesaid)." Under the Sanitary Act, 1866, § 10, the local board of the district was empowered to require the owner of the house to connect the house drains with a main sewer, belonging to the board, and on his default, to do the work, and recover the expenses from the owner in a summary way. The local board having during the demise required the connection to be made, *held*, that the lessee was bound by his covenant to pay the expense of making it. *Crosse* v. *Raw*, 43 L. J. Exch. 144.

When works are executed by a local authority for the improvement of a street, it is necessary, before summary proceedings can be taken for the recovery of the amount apportioned upon any owner, that a demand of payment of the sum so apportioned should be served upon him, and the six months within which the summary proceedings must be taken under 11 and 12 Vict., chap. 43, § 11, are to be reckoned from such notice of demand, and not from the notice of apportionment, which is not a sufficient demand. *Grese* v. *Hunt*, 2 L. R. Q. B. Div. 389; 46 L. J. Q. B. Div. 202; 25 W. R. 543; 36 L. T. (N. S.) 404.

In July, 1877, justices of the peace made orders against the plaintiff and others, one of whom was L., for payment to the local board of the expense of repairing a street. It was agreed that the order should not be enforced for three months, in order to abide the decision on a case to be presented by L. to the Queen's Bench upon a point of law. L. appealed to the Quarter Sessions, and the order against him having been quashed on the ground of a technical error, he did not take a case to the Queen's Bench. The plaintiff was not told of what had taken place, and, in November, her time for appealing having gone by, an order to levy the amount against her was obtained from the justices.

On motion by the plaintiff, and on her undertaking to assent to the statement of a case to the Queen's Bench on the point of law, and on her bringing the amount claimed into court, considering the plaintiff had been misled by the board, the court restrained them from levying unless, or until, she should have an opportunity of stating a case to the Queen's Bench. *Ashworth* v. *Hebden Bridge Local Board*, 37 L. T. (N. S.) 496; V. C. M.

By the Public Health Act, 1848, § 69 (since repealed), the local board might require the owners of premises fronting or abutting

upon any street to sewer and pave the same, and, upon default, might themselves execute the work; and the expenses incurred by them were to be paid by the owners in default, and might be recovered in a summary manner. By section 129, summary proceedings were to be taken before two justices. By the Local Government Act, 1858 (since repealed), Amendment Act, 1861, 24 and 25 Vict., chap. 61, § 24 (since repealed), proceedings for the recovery of demands below £20, which local boards were empowered to recover in a summary manner, might at the option of the local board be taken into the County Court. By 11 and 12 Vict., chap. 43, § 11, in all cases where no time is specially limited for making a complaint before justices, it must be made within six months from the time when the matter thereof arose. A local board under the Public Health Act, 1848, § 69 (since repealed), incurred expenses in sewering and paving a street, upon which premises belonging to R. abutted; his proportion of the expenses amounted to £13 5 6. On the 18th of February, 1873, notice was served by the board on him that the foregoing amount was apportioned upon him, and that the same would become payable by him unless within three months he disputed it. R. did not dispute the apportionment. The money not having been paid, on the 8th of June, 1875, a plaint was issued by the local board in a County Court to recover it from R.'s executor. *Held*, that the limitation of time mentioned in 11 and 12 Vict., chap. 43, § 11, applied as well to proceedings in County Courts as to proceedings before justices, and that the action could not be sustained, it having been brought more than six months after the expiration of the three months allowed for disputing the amount apportioned upon R. *Tottenham Local Board of Health* v. *Rowell*, 1 L. R. Exch. Div. 514; 46 L. J. Q. B. 432; 35 L. T. (N. S.) 887; 25 W. R. 135, D. C. A; S. P., *West Ham Local Board* v. *Maddams*, 33 L. T. (N. S.) 809.

Where a local act required the consent of commissioners to new streets becoming highways, to make the inhabitants liable to repair them, an order of the local board on owners to repair a street, in respect of which such consent had not been given, is lawful, inasmuch as such street was not a highway repairable by the inhabitants at large. *Willes* v. *Wallington*, 13 C. B. (N. S.) 865; 32 L. J. C. P. 86, Exch. Cham.

The Manchester Improvement Act, 1851, enacts in section 17, that the expenses incurred by the town council in sewering and flagging a street shall be borne by the owners, "according to the extent of their respective houses and grounds lying alongside or adjoining to the said street." *Held*, that the owner of ground at the end of a street, forming a *cul de sac*, was liable under this section, although a wall divided his property entirely from the street. *Manchester* (*Mayor, etc.*) v. *Chapman*, 18 L. T. (N. S.) 640; 16 W. R. 974; 37 L. J. M. C. 173, C. P.

A local board of health has no power to enter upon land without the consent of the owner, for the purpose of making reservoirs and

deposit beds for retaining the sewage. *Sutton* v. *Norwich* (*Mayor, etc.*), 27 L. J. Chanc. 739, V. C. K.

A local board of health is not justified in polluting the surface water which flows by an open gutter into a canal, by diverting into a sewer, and passing the sewage into it. *Manchester, Sheffield and Lincolnshire Railway Co.* v. *Worksop Board of Health*, 23 Beav. 198; 3 Jur. (N. S.) 304; 26 L. J. Chanc. 345.

Where a canal company had a statutory power to supply the canal with water out of such "brooks, streams and water-courses as should be found within a certain distance,"—*Held*, that it would be difficult to hold that the mere surface water of a road, not arising from any spring or natural certain supply, could fall within the act, so far and to such an extent as to exclude a local board of health from making a system of drainage essential to the district, which, offending against the rights of no one in any other particular, merely allowed to flow through gratings into the sewer the water collected on a public road from rain, and from the overflowing of the surplus of the neighboring houses, which water had theretofore flowed down an open gutter into a canal. *Ib.*

Under 11 and 12 Vict., chap. 63, §§ 45, 46 and 145, providing that the local board may make necessary sewers, through or under any lands whatever, and cause them to be emptied into such places as may be fit and necessary, provided that nothing in the act shall authorize the boards to use, injure or interfere with any water-course, stream, river, etc., in which the owner of any lands may be interested without the consent of such owner,—*Held*, that persons having a right to watering places in a river adjoining lands for the use of their cattle are interested in the river within the meaning of the proviso, but would not be able to maintain an action for an interference with their rights, unless they were injured by such interference. *Oldaker* v. *Hunt*, 6 De G., M. & G. 376; 1 Jur. (N. S.) 785.

Held, secondly, that works of a local board of health, producing an outfall of the sewage of a town above such watering place, was such an interference as to cause injury to the land-owners; but that whether this was established or not, it ought (if not consented to by them) to be restrained by injunction, being the act of a public body exceeding its powers. *Ib.* A right of fishing is within the term "land," according to the interpretation clause of the 11 and 12 Vict., chap. 63, § 2. *Ib.*

A local board carried the whole drainage of the town into an adjacent river, a small stream which immediately below the town flowed for three miles through the plaintiff's lands on both sides. The plaintiff was also seized of a mill upon the stream. The quantity of sewage matter thrown into the stream was greatly increased, the population of the town having increased nearly one-half, and the extent of sewers from 250 yards in 1848, to 10,500 yards in 1855; and besides other evidence of that, it appeared that sheep could no longer be washed there, that the fish were all dead, and

that the exhalations were noisome. *Held*, first, that the practice long previously and up to 1848, of a few houses in the town to drain into the river, afforded no ground for the local board setting up a prescriptive right, and that the local board, as a modern corporation, could claim no prescriptive rights. *Attorney-General* v. *Luton Local Board of Health*, 2 Jur. (N. S.) 180, V. C. W. *Held*, secondly, that the stream was a private stream, the property of the plaintiff, and, therefore, that the board had no rights except with his consent. *Ib.*

A local board of health made sewers in execution of the powers of 11 and 12 Vict., chap. 63, and 21 and 22 Vict., chap. 98, and in doing so injuriously affected a stream without having obtained the consent of the occupier of a mill on the stream, and entitled to the flow of the stream to his mill. He obtained a *mandamus* to the local board for compensation, and made a claim, first, for damage sustained in consequence of the board opening the main sewer so as to allow the water of the stream to flow through it for forty-six hours; and secondly, for a drain or a trap-door being made out of the stream, and water allowed to flow out of the stream into the trap-door. *Held*, first, that 21 and 22 Vict., chap. 98, § 73, was not confined to cases in which a court of equity would grant an injunction against the local board, and that the occupier of a mill was in the position of a person who would, if the act had not passed, have been entitled by law to prevent the injuriously affecting the stream. *Reg.* v. *Darlington Local Board of Health*, 6 B. &. S. 562; 35 L. J. Q. B. 45; 13 W. R. 789, Exch. Cham.

Held, secondly, that the works of the local board were not authorized by section 73, and, therefore, the claim of the occupier was not the subject of compensation, but a ground of action. *Ib.*

An annual highway board, constituted under 5 and 6 Wm. IV, chap. 50, acting as a local authority under the Nuisances Removal Act, 18 and 19 Vict., chap. 121 (whole act now repealed except as far as relates to the Metropolis), constructed in 1859 a system of sewers, which conveyed the sewage of their district into a stream, and thus occasioned a nuisance in the adjoining district. *Held*, that the highway board of 1865 could not be compelled to take any steps to remedy the existing nuisance, but that they could be restrained from exercising their statutory powers so as to increase the nuisance. *Attorney-General* v. *Richmond*, 12 Jur. (N. S.) 504; 35 L. J. Ch. 597; 2 L. R. Eq. 306; 14 W. R. 686: 14 L. T. (N. S.) 398 V. C. W.

A sewage company was under covenant with a local board to keep their own works in working order, so as to admit the free flow of sewage from sewers of the board. A demurrer to a bill seeking to restrain the company from causing or permitting sewage to remain in the sewers of the board was overruled. *Nuneaton Local Board of Health* v. *General Sewage Company*, 44 L. J. Ch. 561; 20 L. R. Eq. 127, V. C. B.

By the Public Health Act, 1875, § 16, a local authority was

empowered to carry any sewer "into, through or under" any lands within its district, and the act provided for compensation to all persons sustaining damage by reason of the exercise of the powers of the act in relation to any matters as to which they were not themselves in default. A local board under this act proceeded to carry a sewer across private pleasure grounds, on such a level that the bottom of the sewer would be only slightly below the surface, and a permanent embankment about six feet high would be made. *Held*, that the local board was authorized so to do, for that the act did not confine them to carrying a sewer underground. *Roderick* v. *Aston Local Board*, 5 L. R. Ch. Div. 328; 46 L. J. Ch. Div. 802; 25 W. R. 403; 36 L. T. (N. S.) 328, C. A.; affirming decision of the Master of the Rolls, 36 L. T. (N. S.) 170.

An order under the Sanitary Act, 1866, 29 and 30 Vict., chap. 90, § 49 (Parts I, II and III, including this section 49, are repealed, except so far as relates to the Metropolis, or to Scotland or Ireland), reciting that a sewer authority "had made default in providing a proper system of main drainage," and ordering the authority to "do its duty, and begin to set about the works for the purpose within one month from the date of the order, and proceed therewith until completion," is good; and a second order, made after default in complying with the first, appointing a person to "perform the duty of the sewer authority in respect to sewerage, as he should be directed by the Secretary of State," is also good. *Reg.* v. *Cockerell*, 40 L. J. M. C. 153; 19 W. R. 1133; 6 L. R. Q. B. 252.

DRAINS, DITCHES AND OTHER WATER-COURSES.

A natural stream, flowing through and draining agricultural land, was widened, deepened, and otherwise improved, by inclosure commissioners, under a private act, at the expense of the land-owners. In its course it passed through a town, receiving the drainage of two or three houses. *Held*, that it was not thereby converted into a sewer, within 11 and 12 Vict., chap. 63; but even if so, it came within the second exception in section 43, and, therefore, did not vest in the local board, so as to cast upon the board the duty of cleansing and repairing it. *Reg.* v. *Gadmanchester Local Board of Health*, 11 Jur. (N. S.) 63; 5 B. & S. 886; 34 L. J. Q. B. 13; 13 W. R. 155; affirmed on appeal, 5 B. & S. 936; 1 L. R. Q. B. 328; 35 L. J. Q. B. 125; 14 W. R. 375; 14 L. T. (N. S.) 104, Exch. Cham.

A *mandamus* to a local board of health alleged that a drain or a water-course was in such a state as to be a nuisance, injurious to health, and commanded the board to cleanse it. On a return and plea, the stream was found to be in the state alleged. *Held*, that the prosecution was not entitled to judgment, for that the duty of the local board under 11 and 12 Vict., chap. 63, § 58, to cleanse ditches, etc., is only conditional on the neglect of the owner or occupier of the land on which the nuisance exists to remove it after

notice, and no such notice or neglect was alleged in the *mandamus*. *Ib.*

The fact that a water-course is the natural drain of a district, and is polluted to some extent, but not so as to be a nuisance or to prevent a qualified enjoyment of it, by the sewage of some of the houses on its banks flowing or draining into it, does not entitle a local board of health to treat it as a common sewer, and to connect other sewers with it so that it becomes a public nuisance. *Attorney-General* v. *Hackney Local Board*, 33 L. T. (N. S.) 244; 44 L. J. Chanc. 545; 20 L. R. Eq. 626.

When a local board of health is interfering with a water-course in a manner not authorized by the Local Government Act, 21 and 22 Vict., chap. 98, § 68, art. 3, it will be restrained from so doing, and the person injured will not be left to his remedy under the compensation clause of the 11 and 12 Vict., chap. 63, § 144. *Grand Junction Canal Company* v. *Shugar*, 6 L. R. Ch. 483.

By 11 and 12 Vict., chap. 63, § 54, the surveyor of the local board of health may examine any drain, water-closet, privy, cess-pool or ash-pit; and if it is in bad condition, the board shall cause notice in writing to be given to the owner or occupier of the premises, requiring him to do the necessary works; and if such notice be not complied with, the party shall be liable to a penalty for every day during which he makes default. *Held*, that the discretion to determine what works are necessary to be done is vested in the board, and that, on a proceeding before justices to recover the penalty under section 129, they had no jurisdiction to review its determination. *Hargreaves* v. *Taylor*, 3 B. & S. 613; 9 Jur. (N. S.) 1053; 32 L. J. M. C. 111; 11 W. R. 562; 8 L. T. (N. S.) 149.

By a section of a local act, a local board when they think fit may cause the ditches at the sides of, or across public roads and public foot-paths to be filled up, and may substitute pipe or other drains alongside or across such roads. A. was possessed of a freehold close adjoining a public highway. By the side of the highway was a low fence about two feet high, then a strip of green sward averaging ten feet in width, with a broad ditch running parallel to the highway. The close was separated from the strip of green sward by a paling eight feet high. The local board, under the authority of the act of Parliament, filled up the ditch and substituted drain pipes. *Held*, that the ditch being fenced from the highway, the presumption was that it belonged to it, and also, that, as the section referred only to ditches by the side of the highway, the act was not applicable. *Tutil* v. *West Ham Local Board of Health*, 28 L. T. (N. S.) 597; 8 L. R. C. P. 447, C. P.

Buildings.

A local board of health made a by-law, that wherever any open space had been left belonging to any building, such space should never afterward be built upon without the consent of, etc., and without leaving an open space belonging to such building of

specified size and dimensions. *Held*, that if the by-law applied to open spaces belonging to old buildings, it was bad, as exceeding the powers conferred by 21 and 22 Vict., chap. 98, § 34. *Tinker* v. *Rees*, 7 Jur. (N. S.) 629, Q. B.

Lessees had for ninety-nine years a piece of land within the jurisdiction of a local board. The land leased was higher than the street, and was bounded from the street by a wall. They erected a chapel on the land, and in order to approach the chapel, steps were placed on their land. The chapel was erected before the local board was in existence, but the steps and boundary wall were completed afterward. After a resolution of the board and a notice to the lessees, the local board removed the steps and boundary wall and refused compensation. *Held*, that the local board was not justified, under 21 and 22 Vict., chap. 98, and if any by-law authorized the act, such by-law would be unreasonable. *Brower* v. *Holyhead Local Board of Health*, 11 W. R.; 7 L. T. (N. S.) 382, Exch.

The proprietor of a house, which had been erected before the constitution of the district, and was used for an hotel, having a yard with coach-house and stables in the rear, for the purpose of making an addition to the hotel, pulled down the coach-house and stables below the ground floor, and erected upon the site a building three stories high; the only means of access to the upper chambers being by going up the staircase of the old house, and through a passage into the new building. On an information against the proprietor for an offense against the by-law of the local board, made under 21 and 22 Vict., chap. 98, § 34, in not leaving an open space equal to one-third of the area of the ground on which the dwelling-house stood, the justices found that the building erected in the yard, being a new building, built up to and adjoining the old building, must either be considered with the old building as one house, or that the old house and new building must be considered as two erections, and that both old and new buildings must be considered in reckoning the ground upon which the building stood, and convicted him of a breach of the by-law. *Held*, that the conviction could not be sustained because the new erection was not a new dwelling-house, but merely an addition to an old dwelling-house, or because the justice had not found that it was a new dwelling-house, which was essential to the validity of the conviction. *Shiel* v. *Sunderland* (*Mayor, etc.*), 6 H. & N. 796.

An owner of a factory, being desirous of rebuilding his premises, submitted the plans to a committee, to whom the town council, also the local board of health, delegated their powers, and the plans having been approved, pulled down the factory and proceeded to rebuild it according to such plans. The town council, under the 21 and 22 Vict., chap. 98, § 35, relating to buildings to be erected, having required him to set back his premises, the court restrained them, by injunction, from interfering with the erection of the factory according to the approved plans. *Slee* v. *Bradford* (*Mayor, etc.*), 4 Giff. 262; 9 Jur. (N. S.) 815; 8 L. T. (N. S.) 491.

A by-law made by a local board, which provides that if any power or person should construct or cause to be constructed any works, or do any act, or omit to do any act, or to comply with any requirement of the local board, or should make any alterations in any works after they have been completed, whether in new or existing buildings, contrary to the provisions therein contained, the local board might cause such works to be removed, altered or pulled down, is invalid, as exceeding the powers conferred by 21 and 22 Vict., chap. 98, § 34. *Brown* v. *Holyhead Local Board of Health*, 1 H. & C. 601; 32 L. J. Exch. 25.

A by-law by a local board of health, imposing continuing penalties on any person who shall construct any works, or do, or omit to do any act or to comply with any requirements of the board, or shall make any alteration or deviation in any plan approved by the board whether in new or existing buildings, contrary to the provisions therein contained, or shall do any act, matter or thing contrary to the by-laws made under the authority of the 21 and 22 Vict., chap. 98, § 34, or shall omit, neglect or fail to perform any of the work, matters or things required by such by-laws, and empowering the board to remove, alter, pull down, or otherwise deal with such work, as the case may require, is invalid, as exceeding the authority given by the 21 and 22 Vict., chap. 98. *Young* v. *Edwards*, 23 L. J. M. C. 227; 11 L. T. (N. S.) 424, Exch. But see *Hall* v. *Nixon*, 10 L. R. Q. B. 152; 44 L. J. M. C. 51, 55; 32 L. T. (N. S.) 87; 23 W. R. 612.

Making and Validity of Rates, Generally.

The effect of the order of the general board of health and of the 11 and 12 Vict., chap. 63, is to repeal the rating powers given by local acts. *Elmer* v. *Norwich Local Board of Health*, 3 El. & Bl. 517; 2 C. L. R. 886; 18 Jur. 870; 23 L. J. Q. B. 203.

Notice was given by a local board of health of an intention to make a rate under the Public Health Act, 1848, and amending acts. Before the notice had expired these acts were repealed by the Public Health Act, 1875, 38 and 39 Vict., chap. 55, which contained a saving of "any thing duly done" under the repealed enactments, and gave power to make a similar rate upon giving a similar notice. The board, in ignorance of the repeal, made a rate purporting to be made under the repealed acts. *Held*, that the rate was valid, the notice being a "thing duly done," and the accidental reference in the rate to the repealed acts being immaterial to its validity. *Reg.* v. *West Riding of Yorkshire* (*Justices*), 1 L. R. Q. B. Div. 220; 45 L. J. M. C. 97; 35 L. T. (N. S.) 358.

The maintenance of the highways within the district of a local board must be provided for by a district rate, and not by a highway rate, whether the district is or is not conterminous with an ancient parochial division. *Taff Railway Company* v. *Cardiff Local Board of Health*, 8 El. & Bl. 535.

By the Walsall Improvement and Market Act, 1848, commis-

sioners had power to levy an improvement rate within a district not comprising the whole municipal borough as afterward constituted, but the act contained a proviso that the occupiers of land used as a railway should be assessed in proportion only of one-fourth part of the net value. The Public Health Acts, 1872 and 1875, formed the whole municipal borough of Walsall into an urban sanitary district. *Held*, that the assessment ought to be made under the local act and not under the Public Health Acts. *London & North Western Railway Company* v. *Walsall* (*Overseers*), 35 L. T. (N. S.) 626; 25 W. R. 59, Q. B.

The word "railway" in the proviso, 11 and 12 Vict., chap. 66, § 88, meant the way on which carriages actually go, including the line itself, the turn-tables and the sidings; and land used only for the purpose of supporting this way, as for embankments, etc., is within the proviso, and to be assessed at the lower rate. But the adjuncts, such as stations and warehouses, though necessary for the working of the railway, did not form part of it within the proviso, and land used for these latter purposes was assessable at its full and annual value. *South Wales Railway Company* v. *Swansea Local Board of Health*, 4 El. & Bl. 189; 1 Jur. (N. S.) 326; 24 L. J. M. C. 30.

By the Public Health Act, 1872, 35 and 36 Vict., chap. 79, § 43, any limit imposed on or in respect of any rate by any local act of Parliament shall not apply to any rate required to be levied for the purpose of defraying any expenses incurred by a sanitary authority for sanitary purposes. *Held*, that this provision does not make ratable any premises which, under the local act, were altogether exempt from rates. *Walton* (*Commissioners*) v. *Walford*, 23 W. R. 292; 10 L. R. Q. B. 180; 44 L. J. Q. B. 74.

A *mandamus* lies to a local board of health to make a rate in aid of a judgment within six months after the judgment is obtained, though the action in which it was obtained is commenced more than six months after the claim accrued, if the delay in bringing the action is excused, and shown not to have been undue delay. *Worthington* v. *Hutton*, 1 L. R. Q. B. 63; 6 B. & S. 943; 12 Jur. (N. S.) 73; 35 L. J. Q. B. 61; 14 W. R. 632; 13 L. T. (N. S.) 463.

CONTRACTS.

A local board of health for a non-corporate district gave notice to the owners of the premises fronting, adjoining or abutting on certain streets, requiring them to sewer, level, pave, flag and channel the same, which notices not being complied with within the specified time, the board entered into contracts with a third person for their performance; which contained provisions that the contractor was to be paid for the work when the money was collected from the owners of the adjacent properties; the work was done accordingly, but the owners having refused payment, justices before whom they were summoned for non-payment dismissed the summonses. *Held*, that the contractor was entitled to sue the board of health for the work done by him under the contracts. *Worthington* v. *Sudlow*, 2 B.

& S. 508; 31 L. J. Q. B. 131; 8 Jur. (N. S.) 668; 10 W. R. 621; 6 L. T. (N. S.) 283.

Actions for Neglect of Duty, Injuries to Property or Persons, etc.

A local board of health constructed a sewer along the bank of a river, with trap-doors in it, communicating with the river. When the river was full, and water abundant, the board, by means of the trap-doors, drew the water off from the river, and let it into the sewer for the purpose of flushing it. The place where the trap-doors were placed was at a part of the river above that on which a mill, occupied, was situated. On one occasion the board made a hole in the bottom of the river, and so let the stream run into the sewer for nearly two days continuously, during that time obstructing the water of the river in such quantities that the mill ceased working for want of water. *Held*, that the acts of the board were in excess of the powers given them by statute; that they had injuriously affected the river; and that the owner of the mill might have brought an action for the wrong, and also, in such action, obtained an injunction against the continuance of it; that he was, therefore, an individual entitled by law to prevent or to be relieved against the injuriously affecting the river within 21 and 22 Vict., chap. 98, § 73; and consequently that he could not sustain a *mandamus* against the board to summon a jury to assess him compensation. *Darlington Local Board of Health, in re*, 35 L. J. Q. B. 45; 13 W. R. 789; 6 B. & S. 562, Exch.

An action will lie against a local board of health of a corporate district, as a body, for negligence in carrying out works within its powers, so as to cause injury to any person, *e. g.*, for so negligently and improperly constructing a sewer as to cause a nuisance by its discharge. *Southampton and Hitchin Bridge Company* v. *Southampton Local Board of Health*, 8 El. & Bl. 801; 4 Jur. (N. S.) 1298; 28 L. J. Q. B. 41.

In an action against a local board of health for damages sustained by an irruption of sewerage caused by the sewers being improperly constructed, former applications by the plaintiff to the board for compensation on similar occasions, with their answers, awarding compensation, are admissible on his part. Although the fact that such application was made will not settle the question of responsibility for a particular sewer, coupled with the fact that on the occasion in question the board appeared only to dispute their liability on the ground that the occurrence was occasioned by an extraordinary storm, and with some (even though slight) evidence that it was caused by defective construction of the sewers, there will be sufficient evidence of liability. Nor will there be sufficient evidence that a storm was so extraordinary as to excuse the parties responsible for the sewers, unless the evidence extends over a considerable range of years, during which the sewers have been in existence. *Brown* v. *Sargent*, 1 F. & F. 112, Exch.

A local board of health is not liable to an action for permitting a public footway in their district to be out of repair, whereby the plaintiff was injured. *Gibson* v. *Preston* (*Mayor, etc.*), 10 B.& S. 942; 22 L. T. (N. S.) 293; 18 W. R. 689.

A person riding along a highway, under which was a sewer the property in which was vested in the local board of health, his horse trod upon a defective grid or grating put there to drain the surface water off the road into the sewer, the grid gave way and his horse's leg was injured. He brought an action against the local board of health of the district, who were likewise the surveyors of the highway. *Held*, that though the local board might not be liable as surveyors of the highway, they were liable as owners of the sewer, of which the grid formed part, for negligence in not keeping the grid in a proper state. *White* v. *Hindley Local Board of Health*, 10 L. R. Q. B. 219; 44 L. J. Q. B. 114; 32 L. T. (N. S.) 460; 23 W. R. 651.

Members of a local board of health are not personally liable for expenses incurred by a witness instructed by the board. *Binley* v. *Cuckson*, 7 W. R. 16; 32 L. T. 124, Q. B.

Section 264 of the Public Health Act, 1875, requiring a month's notice to be served on a local authority before commencing an action for any thing done under the provisions of the act, does not apply where the object of the action is to restrain the commission of a nuisance, and this notwithstanding the plaintiff also claims compensation for past damage. *Flower* v. *Low Leyton Local Board*, 46 L. J. Ch. Div. 621; 5 L. R. Ch. Div. 347; 36 L. T. (N. S.) 760; 25 W. R. 545, C. A., reversing the decision of MALINS, V. C., 36 L. T. (N. S.) 236; 25 W. R. 423.

COMPENSATION FOR DAMAGES; ARBITRATION AND UMPIRAGE.

A board of health is not bound to give compensation for any damage which it may cause, which would not have been actionable if it had not been acting under the authority of the statute. *Hull* v. *Bristol* (*Mayor, etc.*), 2 L. R. C. P. 322; 36 L. J. C. P. 111; 15 W. R. 404; 15 L. T. (N. S.) 572.

An occupier of a mill situate on a river, and the representative of the riparian proprietor, being entitled to the uses of the water for the purposes of the mill, obtained a *mandamus* against a local board of health on the following grounds: First, that they constructed a sewer, running partly alongside of, and partly under, the river, commencing at a point above, and terminating at a point below the mill, for the flushing of which a portion of the waters of the river was admitted and diverted for two days, during which the mill was hereby prevented from working. Secondly, for the loss of water occasioned by reason of the percolation of underground springs into the sewer, which would otherwise have found their way into the river; and also the percolation of water from the river into the sewer; thirdly, for the construction of trap-doors into the same, which were occasionally opened for the purpose of flushing it; and

fourthly, for the diversion of the surface drainage waters of the town into the sewer, which before had been conveyed by artificial drains into the river. *Held* (assuming the injuries to have been such as to form just ground of complaint), that the remedy was not by *mandamus*, but by action. *Reg.* v. *Darlington Local Board of Health*, 10 Jur. (N. S.) 1196; 33 L. J. Q. B. 305; 6 B. & S. 562; 12 W. R. 1034; 10 L. T. (N. S.) 602.

Jurisdiction of Arbitrators.

When an arbitrator has been appointed by one party, under the provisions of the Public Health Act, 1875, §§ 179, 180, his jurisdiction is not ousted by the other party denying his liability and refusing to appear. *Burgess* v. *Norwich Local Board*, 26 W. R. 19; 37 L. T. (N. S.) 355, C. P. Div.

In *Ringland* v. *Lowndes*, 10 Jur. (N. S.) 850; 33 L. J. C. P. 337; 17 C. B. (N. S.) 514; 12 W. R. 1010, Exch. Cham., it was held, that the local board which had, by its clerk, at the time of the reference before the umpire, protested against the proceedings, but had, nevertheless, gone into the case, examined witnesses, and addressed the umpire, was stopped from afterward disputing the umpire's jurisdiction.

Proceedings for Penalties.

The Public Health Act, 1875, § 253, enacts that proceedings for the recovery of a penalty under that act shall not be "taken by any person other than by a party aggrieved," or by a local authority, without the consent of the Attorney-General; and by sch. 2, r. 70, a penalty of £50 is imposed upon any person acting as a member of a local board without qualifications. The defendant, who was acting as a chairman of a local board after disqualification, made a complaint to the members thereof as to certain conduct of the plaintiff, who was clerk to the board; the plaintiff, fearing that he might be dismissed from his office, resigned it, and sued the defendant to recover a penalty of £50 for acting without qualification. *Held*, that the plaintiff was not "a party aggrieved" within the meaning of the Public Health Act, 1875, § 253, and that he could not sue for the penalty without the consent of the Attorney-General. *Rochfort* v. *Atherly*, 1 L. R. Exch. Div. 511; S. C., *nom. Smith* v. *Fieldhouse*, 35 L. T. (N. S.) 602.

In *Hollis* v. *Marshall*, 2 H. & N. 755, it was held that a candidate for the office of commissioner, under the Cheltenham Improvement Act, was not a party aggrieved by the defendant, the successful candidate, who was not duly qualified, acting as a commissioner. The plaintiff alleged that he was aggrieved as a rate-payer, voter, and resident within the borough, and also as such candidate. This case arose under the repealed act 11 and 12 Vict., chap. 63, § 133, which section was incorporated into the local improvement act of the borough in question.

PROCEEDINGS BEFORE JUSTICES.

By the Public Health Act, 1875, § 126, subs. 2, any person who, while suffering from an infectious disorder, willfully exposes himself, without proper precautions against spreading the disorder, in any street or public place, or who, being in charge of any person so suffering, so exposes such person, is subject to a penalty.

A medical man, in practice at Tunbridge, sent a patient, who was suffering from scarlet fever, to the fever hospital there, with a certificate, directing him to walk in the middle of the road, and not to talk to any one; but, in consequence of an alleged informality in the certificate, the patient was refused admission; whereupon the medical man walked with him through the streets of the town to the residence of the chairman of the local board, from whom, after some delay, he obtained an order for the man's admission to the hospital. He then returned with the patient to the police-station to procure the ambulance to convey him thither. Upon an information against the medical man for an alleged infringement of the statute, the justices were of opinion that it was not proved before them that the medical man had charge of the patient, that he had not willfully exposed the patient in any street or public place without proper precaution, and that he had made the best use of the means at his disposal to prevent the spread of the fever; and they refused to convict him. *Held*, that their decision was right. *Tunbridge Wells Local Board* v. *Bisshopp*, 2 L. R. C. P. Div. 187.

The owners of a house and area, situate in and fronting a street, altered the front of the house by throwing out bay-windows, projecting beyond the street line of frontage, but not beyond the limits of the area. After the completion of the alterations, the local authority threatened them with summary proceedings before the justices for the recovery of penalties under the Public Health Act, 1875, on the ground that they had set forward their building without the written consent of the local authority, under section 156. The owners then moved *ex parte* for an injunction to restrain the local authority from taking these proceedings, alleging that as the alterations had been made over their own property, the local authority, in threatening proceedings, were acting *ultra vires;* that they having had notice of the intention of the owners to make the alterations, were bound by acquiescence; and that the justices had no jurisdiction, as the local authority had not made their complaint within six months after the alleged offense, as required by section 252. The injunction was refused. *Kerr* v. *Preston* (*Corporation*), 6 L. R. Ch. Div. 463; 46 L. J. Chanc. Div. 409; 25 W. R. 264, R.

The 38 and 39 Vict., chap. 55, known as the Public Health Act of 1875, forms now the basis of all legislation on the subject of the public health generally. For the most part all prior acts are by it more or less repealed, and when, therefore, an act is spoken of as simply repealed, it may be assumed that this statute is referred to as the repealing act in such case.

Public Health Law in the United States.

State Quarantines.

I. The quarantines and other restraints established by the health laws of any State, or pursuant thereto, respecting vessels arriving in or bound to any port or district thereof, required to be duly observed by collectors and all other officers of the revenue of the United States, and by masters and crews of revenue cutters, and by military officers in any fort or station upon the sea coast. Such officers authorized and required faithfully to aid in the execution of such quarantines and health laws, according to their respective powers and precincts, and as they shall be directed from time to time by the Secretary of the Treasury of the United States. The Secretary is authorized when a conformity to such quarantines and health laws shall require it, and in respect to vessels which shall be subject thereto, to prolong the terms limited for the entry of the same, and the report or entry of their cargoes and to vary or dispense with any other regulations applicable to such reports or entries. *Provided, etc.* Act of February 25, 1799, § 1; 1 Stat. at Large, 619; 1 Bright. 810.

II. When by the health laws or regulations of a State, any vessel arriving within a collection district of such State shall be prohibited from coming to the port of entry or delivery for such district, and it shall be required or permitted by such health laws that the cargo of such vessel be unladen at some other place within, or near to such district, the collector may grant permit for the unlading thereof at some other place where such health laws shall permit. Provisions for unlading, custody, and delivery of the cargo. *Ib.*, § 2.

III. There shall be purchased or erected under the orders of the President of the United States, suitable warehouses with wharves, and inclosures where goods and merchandise may be unladen and deposited from any vessel which shall be subject to a quarantine, or other restraint, pursuant to the health laws of any State as aforesaid, at such convenient place or places therein, as the safety of the public revenue and the observance of such health laws may require. *Ib.*, § 3.

IV. *During prevalence of any contagious or epidemical disease*, in the port of entry for any collection district, the Secretary, or in his absence, the Comptroller of the Treasury of the United States, may authorize the removal of the collector, and the officers employed in his department, from such port, to any other more convenient place within or as near as may be to such collection district, where such collector and officers may exercise the same authorities, and shall be liable to the same duties, according to existing circumstances, as in such lawful port or district; and of such removal public notice shall be given as soon as may be. *Ib.*, § 4.

V. It shall be lawful for the judge of any District Court of the United States, within whose district any contagious or epidemical

disease shall at any time prevail, so as in his opinion to endanger the life or lives of any person or persons confined in the prison of such district in pursuance of any law of the United States, to direct the marshal to cause the person or persons confined as aforesaid, to be removed to the next adjacent prison where such disease does not prevail, there to be confined until he, she, or they may safely be removed back to the place of their first confinement; which removal shall be at the expense of the United States. *Ib.*, § 5.

VI. In case of the prevalence of a contagious or epidemical disease at the seat of government, it shall be lawful for the President of the United States to permit and direct the removal of any or all the public officers to such other place or places as, in his discretion, shall be deemed most safe and convenient for conducting the public business. *Ib.*, § 6.

VII. Adjournment of Supreme Court, Circuit Court, or District Court, authorized, whenever prevalence of such disease renders it hazardous to hold session. *Ib.*, § 7.

1. No vessel or vehicle coming from any foreign port or country where any contagious or infectious disease may exist, and no vessel or vehicle conveying any person or persons, merchandise or animals, affected with any infectious or contagious disease, shall enter any port of the United States or pass the boundary line between the United States and any foreign country, contrary to the quarantine laws of any one of said United States, into or through the jurisdiction of which said vessel or vehicle may pass, or to which it is destined, or except in the manner and subject to the regulations to be prescribed as hereafter provided. Act of April 29, 1878, chap. 66, § 1; 20 Stat. at Large, 37.

2. "Whenever any infectious or contagious disease shall appear in any foreign port or country, and whenever any vessel shall leave any infected foreign port, or having on board goods or passengers coming from any place or district infected with cholera or yellow fever, shall leave any foreign port, bound for any port of the United States, the consular officer, or other representative of the United States at or nearest such foreign port shall immediately give information thereof to the supervising surgeon-general of the Marine Hospital service, and shall report to him the name, the date of departure, and the port of destination of such vessel, and shall also make the same report to the health officer of the port of destination in the United States, and the consular officers of the United States shall make weekly reports to him of the sanitary condition of the ports at which they are respectively stationed."

Powers and duties of surgeon-general, in execution of the act declared. *Ib.*, § 2.

3. Powers and duties of surgeon-general, of medical officers, and customs officers declared. *Ib.*, §§ 3, 4.

4. "Whenever at any port of the United States, any State or municipal quarantine system may now, or may hereafter exist, the officers or agents of such system shall, upon the application of the

respective State or municipal authorities, be authorized and empowered to act as officers or agents of the national quarantine system, and shall be clothed with all the powers of United States officers for quarantine purposes, but shall receive no pay or emoluments from the United States. At all other ports where, in the opinion of the Secretary of the Treasury, it shall be deemed necessary to establish quarantine, the medical officers or other agents of the Marine Hospital service shall perform such duties in the enforcement of the quarantine rules and regulations as may be assigned them by the surgeon-general of that service under this act: *Provided*, that there shall be no interference in any manner with any quarantine laws or regulations as they now exist or may hereafter be adopted under State laws." *Ib.*, § 5.

5. *National Board of Health.*—"There shall be established a National Board of Health, to consist of seven members, to be appointed by the President, by and with the advice and consent of the Senate, not more than one of whom shall be appointed from any one State, whose compensation, during the time when actually engaged in the performance of their duties under this act, shall be $10 per diem each, and reasonable expenses, and of one medical officer of the army, one medical officer of the navy, one medical officer of the Marine Hospital service, and one officer from the department of justice, to be detailed by the Secretaries of the several departments and the attorney-general, respectively, and the officers so detailed shall receive no compensation. Said Board shall meet in Washington, within thirty days after the passage of this act, and in Washington or elsewhere, from time to time, upon notice from the president of the board, who is to be chosen by the members thereof, or upon its own adjournments, and shall frame all rules and regulations authorized or required by this act, and shall make or cause to be made such special examinations and investigations, at any place or places within the United States, or at any foreign ports, as they may deem best, to aid in the execution of this act, and the promotion of its objects." Act of March 3, 1879, chap. 202, § 1; 20 Stat. at Large, 37.

6. "The duties of the National Board of Health shall be to obtain information upon all matters affecting the public health, to advise the several departments of the government, the executives of the several States, and the commissioners of the District of Columbia, on all questions submitted by them, or whenever, in the opinion of the Board, such advice may tend to the preservation and improvement of the public health." *Ib.*, § 2.

ALABAMA.

Title 13, *chap.* 4, *Feb.* 19, 1875, p. 130.

SECTION 1. The Medical Association of the State of Alabama, organized in accordance with the provisions of the Constitution, which was adopted by the association at its annual meeting, in the city of

Tuskaloosa, in March, 1873, is constituted the Board of Health of the State. § 1536.

§ 2. The Board of Health of this State shall take cognizance of the interests of health and life among the people of the State; shall investigate the causes and means of prevention of endemic and epidemic diseases; shall investigate the influences of localities and employments upon the public health; shall from time to time make to the General Assembly, such suggestions as to legislative action as, in their judgment, may seem advisable, and shall be in all ways the medical advisers of the State. § 1537.

§ 3. The Board of Health shall make to the Governor, for transmission to the General Assembly, an annual report of their investigations and transactions, of which annual report there shall be published as other reports transmitted through the Governor to the General Assembly, a sufficient number of copies for distribution among the members of the General Assembly, and the members of the Board of Health of the State, and such additional numbers as may be deemed advisable, for the purpose of exchanging for reports of similar associations in other States. § 1538.

§ 4. The county medical societies in affiliation with the Medical Association of the State, and organized in accordance with the provisions of the Constitution, are constituted boards of health for their respective counties, and as such shall be under the general direction of the Board of Health of the State. § 1539.

§ 5. The county boards of health thus established shall have only advisory powers, and shall be conducted without expense to the State, or to their respective counties, except under the condition provided for under section following. § 1540.

§ 6. The competent legal authority of any county in this State, or of any incorporated city or town of any such county, shall, whenever, in their judgment, it becomes expedient to do so, invest the board of health of the county with such executive powers and duties for the promotion of the public health, and under such rules and stipulations as may be agreed upon between the two parties. § 1541.

§ 7. In any such agreement as is contemplated in the preceding section, the right to elect or appoint the officers and servants employed in the administration of the sanitary regulations so agreed upon shall, in all cases, be reserved to the Board of Health; and all questions relating to salaries, appropriations and expenditures shall be reserved to the legal authorities of the county, town, or city. § 1542.

§ 8. No board of health, nor advisory nor executive medical body of any name or kind, for the exercise of public health functions, shall be established by authority of law in any county, town or city of this State, except such as is contemplated by the provisions of this chapter; but nothing in this chapter shall be so construed as to prevent any of the boards of health created herein from accepting and executing any special powers that may be granted them by the General Assembly of the State. But this chapter may

be changed, modified or repealed at any time at the pleasure of the General Assembly. § 1543.

Title 13, *chap.* 2. When any health officer in any town makes complaint, on oath, that there is good cause of suspicion or belief that there is on any premises in such town, or in any vessel within its limits or vicinity, any cause of disease or infection, necessary to be destroyed or removed, or one or more persons, strangers to the place, infected with a dangerous contagious disease, and that he has been refused admission, any justice of the corporation or county in which such lot, house or vessel is, may issue his warrant to the proper officer, directing him to enter such premises or vessel, and, under direction of the health officer, to remove such infected person, and remove or destroy such source of infection or disease. § 1505.

All expenses incurred in executing such warrant, and for maintaining, nursing and curing any person removed under the provisions of this chapter, must be paid by such person, or the owner of the premises or vessel; or, if not so paid, then by the town (including city), the person by whom such should have been paid remaining liable. § 1506.

Any person coming into any town by land, from a place infected with a contagious disease, may be compelled to perform quarantine by the health officer, and restrained from traveling until discharged. § 1512.

CALIFORNIA.

§ 3008. *Powers of health officer.*—He may, in his discretion, cause the removal to a hospital of any and all persons, within the limits of the city and county of San Francisco, infected with variola. *Amendment approved March* 9, 1878.

§ 3061. It shall be the duty of the board of trustees, council or other corresponding board, of every incorporated town and city of this State, to establish, by ordinance, a board of health for such town or city, to consist of five persons, one at least of whom shall be a practicing physician and a graduate of some reputable school of medicine, and one, if practicable, a civil engineer. Every local board of health established in this State must:

First. Supervise all matters pertaining to the sanitary condition of their town or city, and make such rules and regulations thereto, as are necessary and proper, and not contrary to law.

Second. Report to the Secretary of the State Board of Health at Sacramento, at such times as the State Board of Health may require:

a. The sanitary condition of their locality.

b. The number of deaths, with the cause of each as near as can be ascertained, within their jurisdiction, during the preceding month.

c. The presence of any epidemic or other dangerous, contagious

or infectious disease, and such other matters within their knowledge or jurisdiction as the State Board may require.

The trustees, council or other legislative board, by whatever name known, of any incorporated city or town of this State, may by ordinance adopt any portion of articles 3 and 4 of this chapter, or either of them, for some definite period of time, as may seem proper for the regulation of sanitary matters within their town or city. *Amendment approved March* 19, 1878; *amendments March* 9, 1877–8, 59, *took effect immediately.*

[The act of March 19, 1878, from which the foregoing amendment is taken, contained the following additional section :

§ 2. This act shall not extend to any incorporated city or town, or city or county, for which health regulations are provided by special statutes.]

§ 3033. Whenever it shall be certified to the Board of Health, by the health officer, that any building, or part thereof, is unfit for human habitation, by reason of its being so infected with disease as to be likely to cause sickness among the occupants, or by reason of its want of repair has become dangerous to life, said Board may issue an order, and cause the same to be affixed conspicuously on the building, or part thereof, and to be personally served upon the owner, agent or lessee, if the same can be found in this State, requiring all persons therein to vacate such building, for the reasons to be stated therein as aforesaid.

Such building, or part thereof, shall within ten days thereafter be vacated, or within such shorter time, not less than twenty-four hours, as in said notice may be specified; but said Board, if it shall become satisfied that the danger from said house has ceased to exist, may revoke said order, and it shall thenceforth become inoperative. *New section approved March* 9, 1878; *amendments* 1877–8, 58; *took effect from passage; repealing conflicting acts.*

§ 3034. Every physician in the city and county shall report to the health officer, in writing, every patient he shall have laboring under Asiatic cholera, variola, diphtheria, or scarlatina, immediately thereafter, and report to the same officer every case of death from such disease, immediately after it shall have occurred.

§ 3026. Superintendents of cemeteries within the boundaries of the city and county of San Francisco must return to the health officer, on each Monday, the names of all persons interred or deposited within their respective cemeteries for the preceding week. *Amendments approved March* 9, 1878; *amendments* 1877–8, 57; *took effect from passage; repealing conflicting acts.*

§ 3009. The Board of Health *must* appoint a quarantine officer, who shall be a physician in good standing, a secretary, one assistant secretary, six health inspectors, one market inspector, and one messenger, whose duties must be fixed by the Board of Health; they must also appoint one superintendent physician, one resident physician, one steward, one matron, one apothecary, two visiting physicians, two visiting surgeons, as officers of the city and county

hospital in and for the city and county of San Francisco, one each of said visiting physicians and surgeons to be nominated by the faculty of the medical department of the University of California, and one each of such visiting physicians and surgeons to be nominated by the Medical College of the Pacific. Said Board may also appoint one engineer for the city and county hospital. They may also appoint one superintendent, one resident physician, one matron, and such other employees as are now authorized by law to be employed in and for the alms-house of said city and county. They shall have also power to appoint and prescribe the duties of one city physician and one assistant city physician, who shall be designated as police surgeons, and whose duty it shall be to make all autopsies required of them by the coroner of said city and county. And such Board is also empowered to appoint such employees and such medical attendants as they may deem necessary in the health department, and in all the various institutions which are by law placed under their supervision; and the compensation of such employees and medical attendants shall be fixed by the Board of Health. The appointing power aforesaid is vested solely in said Board of Health, and said Board shall have power to prescribe the duties of said appointees, and shall not remove the same without just cause. The heads of departments appointed by the Board of Health, to-wit: The health officer, resident physician of city and county hospital, and superintendent of alms-house, shall not be removed except by a concurrence of four members of said Board of Health. *Amendment approved March* 9, 1878; *amendments* 1877–8, 52; *took effect from passage; repealing conflicting acts.*

South Carolina.

There does not appear to be in this State any provision for the establishment of local boards of health for cities, towns or villages, but there is specific legislation on the subject of quarantine, to-wit, chapter 33 of the Revised Statutes (A. D. 1873); No. 141, Statutes at large, § 2 (A. D. 1879). The quarantine laws are of very similar import to those existing in other States, previously referred to, an appeal being also given to any person aggrieved by any decision or order of the health officer to the Governor, Attorney-General and Comptroller-General, constituting a board of appeal. By chapter 34 of the Revised Statutes power is also given to the Governor to make such regulations as he may deem necessary to prevent the entrance of Asiatic cholera and prevent the spreading of it in the State.

North Carolina.

By chapter 117 (A. D. 1879) it is enacted that the Medical Society of North Carolina shall choose from its active members, by ballot, six members, and the Governor shall appoint three other persons (of whom one shall be a civil engineer) to constitute the Board of

Health; that this Board shall make sanitary investigations and inquiries, the causes especially of epidemics, the sources of mortality, the effects of locations, employments, and conditions upon public health; they shall be the medical advisers of the State. The members shall be chosen, two for six years, two for four and two for two. They shall receive no pay except when on actual duty.

There shall be an auxiliary board of health in each county. These boards shall consist of the physicians eligible to membership in the State Medical Society, the mayor * * * of county town, the chairman of the county commissioners, and the city surveyor, otherwise the county surveyor. From this number one physician to be chosen, to act for two years, with the title of superintendent of health. His duty shall be to gather vital statistics (*inter alia*).

These boards of health are to be subordinate to the State Board. Inland quarantine shall be under the control of the superintendent who, acting under the advice of the local board, shall see that smallpox, scarlet fever, yellow fever and cholera shall be properly quarantined or isolated (at the expense of the city or town in which it occurs).

Any violation of the rules promulgated shall subject the offender to a fine of $2,500, and imprisonment for not longer than twenty days in the public jail.

Abatement of Nuisances.

Upon due notification of the existence of a nuisance upon any premises the parties failing to abate the same shall pay a fine of one dollar a day, dating from twenty-four hours after the notification has been served, *provided* that if the party notified is unable to carry out the directions of the superintendent, it shall be done at the expense of the town or city.

The State Board of Health shall keep a supply of fresh animal vaccine virus. The county superintendents shall vaccinate and revaccinate all applying for such service, free of charge, and shall vaccinate every person admitted into a jail, work-house, poor-house or public school, unless they be satisfied that such person is already successfully vaccinated. There are other duties connected with coroner's inquests which devolve upon him, but they relate to the ends of justice rather than to the public health.

COLORADO.

By section 3 of an act of the Legislature of this State (A. D. 1879), amending "An act to reduce the law incorporating the city of Denver," etc., the city council shall cause sewers to be constructed in any district whenever the Board of Health recommend the same as necessary for sanitary reasons, and said recommendation is approved by the city council.

And by an act of the same date a sum of $800 is appropriated out of any money in the State treasury, not otherwise appropriated, for

the expenses of the State Board of Health during the years 1879 and 1880.

Connecticut Public Health.

§ 1. By chapter XI, title 16 of the Revised General Statutes of Connecticut, the justices of the peace and selectmen in each town shall establish a board of health and have all the power necessary and proper for preserving the public health and preventing the spread of malignant diseases therein, and may appoint a president and health officers or health committees and delegate to them their powers. Any number of members at a properly convened meeting shall be a quorum, and may appoint a clerk to record the acts of the board.

§ 2. Duty of board to examine into all nuisances and sources of filth injurious to the public health, and cause the removal of all filth within town; all expenses incurred to be paid by offending party, and if not known, then by the town. The owner or occupant of private property on which such nuisances are found shall, if he neglect to remove the same after notification, be fined not less than twenty dollars nor more than one hundred dollars, and pay the expense and costs of such removal, and after expiration of time allowed for such removal, board may abate or remove such nuisance, and such board, health officer, or committee may enter all premises where they have cause to suspect such nuisance or filth to exist.

§ 3. Any one willfully violating any of the rules of the board, after due notice and publication of them, shall forfeit not less than fifteen dollars nor more than one hundred dollars.

§ 8. The board of health in any town contiguous to navigable waters may assign where any vessels shall, if need be, perform quarantine.

§ 9. No master of a vessel liable to perform quarantine shall fraudulently attempt to evade or elude quarantine by false declarations, or suffer to be landed any person or thing contrary to the provisions of this act, or permit any person to board such vessel before it shall have been visited by the officer of health.

§ 10. Health officer or member of the board of health may, under directions of the board, direct any vessel liable to quarantine to be cleansed, and any sick persons found therein to be removed and cared for, and any passenger, and such of the mariners as the master may not require, to be removed on shore and secluded for fourteen days; any person visiting, without permission, any person so confined, shall be liable to a like confinement and penalty.

§ 12. Board of health of any town may interdict communication between it and any town or place in which any contagious or malignant disease is prevalent.

§ 13. Every taverner or lodging-house keeper shall, within twelve hours of any lodger falling sick of any malignant or contagious disease, between 1st May and 1st November, report the same in writing to board of health.

§ 14. Any justice of the peace may issue his warrant to any proper officer, or indifferent person, if need be, requiring him to execute the same.

§ 16. Boards of health may order into confinement, in any place to be designated by the board, any person whom they have reasonable ground to believe to be infected, etc.

§ 17. Boards of health may adopt rules for vaccination, the expenses, in whole or in part, to be paid out of the town treasury.

§ 18. Any person refusing to be vaccinated, unless in the opinion of a physician other than the physician of the board of health, it would not be prudent on account of sickness, shall forfeit $5 to the town.

§ 19. Every person violating any provision of the preceding sections, for which no other penalty is provided, shall be fined not exceeding $500, or imprisoned not exceeding six months, or both.

DELAWARE.

By Revised Statutes of this State (A. D. 1874), chapter 46, the Governor shall appoint three physicians in each county to be health officers for such county.

Their duties shall be to board vessels and investigate the state of the persons and cargo.

Health officers may refuse to permit landing of any person or goods upon making a report thereof to the proper authorities, and may refuse permisson to any person to go on board such vessel.

The proper authorities, therein specified, may, under the advice of the health officer, make proclamation of the prevalence of any infectious disease in any port or place, and all placed on board any vessel from such port or place shall be subjected to quarantine, and the vessel be not allowed to approach within certain limits therein mentioned.

And further, if any person traveling on foot from any infected place, shall after proclamation issued, enter any place thus proscribed, or shall violate any of the regulations, he shall forfeit and pay $40.

By the Laws of 1879, chapter 21, Governor shall appoint seven physicians, members of the medical society; three of whom shall be residents of New Castle county, and two each of Kent and Sussex counties, who shall constitute the Board of Health of the State. Term of office of one from each county shall expire every two years.

Members of the Board shall receive no salary, but actual expenses when engaged on duties of the Board, shall be allowed. They shall meet at least once in six months.

Said Board shall encourage establishment of local boards of health; shall make inquiries respecting disease, epidemics, etc., and all health officers and boards of health shall communicate with State Board, and State Board shall supply all information to local boards. State Board may require information from all public dispensaries, asylums, prisons and schools, and from all other public institutions, relating to the proper discharge of the duties of the State Board.

They shall have authority to make special inspection of hospitals, prisons, asylums, alms-houses, etc., and report the result to the Legislature at each regular session.

GEORGIA.

§ 1375. According to the Code of the State of Georgia, part 1, title XVI, chapter 2, the corporate authorities of any city or town may establish in them, respectively, or in their vicinity, hospitals or pest-houses, to be subject to such regulations, not contrary to law, as such authorities may make, to prevent the spread of infectious or contagious diseases; but where such authorities may establish such hospitals, etc., out of their own jurisdictional limits, such shall be only on land acquired by such corporations for protection against the spread of diseases within their own limits. In all other cases the Ordinary of the county is vested with the power to establish such hospitals and make such regulations.

§ 1376. *Quarantine.*—The corporate authorities of such town may prescribe the quarantine to be observed by all vessels arriving within the harbor or vicinity of such town, and all legal regulations therefor, extending to all persons, goods and effects arriving in such vessels, and to all persons going on board the same. Any person violating such regulations, after due personal notice, or after five days' public notice, as therein described, shall be guilty of a misdemeanor, and on conviction, shall be liable to a fine not exceeding $500, or such other penalty, not exceeding $100, in lieu of the above, as may be prescribed in any ordinance or by-laws of any corporation having power to pass ordinance or by-law.

§ 1377. Any town may establish a quarantine ground at any place within the harbor, if a seaport town, but not so as to interfere with the rights of private property; and the jurisdiction of the corporation of Savannah shall, in cases of quarantine, extend to all ships, etc., entering any port or inlet from Ossabaw sound to Tagbee, including all inlets, creeks and rivers within those limits.

§ 1378. The health officer or visiting physician may, under the direction of the corporate authorities, cause any vessel arriving therein, or in the vicinity, to be removed to the quarantine ground or other place to be inspected, and any master, seaman, or passenger belonging to a vessel supposed to have infection on board, or from any port where infectious disease prevails, refusing to answer, on oath, inquiries on the subject, made by any health officer, shall be guilty of a misdemeanor, and liable to a fine of $100.

§ 1379. Any person ordered to perform quarantine, escaping, may be arrested under warrant and delivered to the custody of the officers of the quarantine, and any person attempting to escape may be forcibly detained.

§ 1380. The master of any vessel ordered to perform quarantine shall deliver his bill of health and manifest, log book and journal; failing to do so, or to repair to quarantine ground after notice, or to depart thence, without authority, he shall be guilty of a misdemeanor, and, on conviction, shall be fined not less than $200.

§ 1381. Any person coming into town by land from a place infected may be compelled to perform quarantine by health officer, under direction of the corporate authorities, and restrained from traveling until discharged. And any person infringing this regulation shall, upon conviction, be fined not exceeding $100.

§ 1382. Pilots are required to make strict inquiry as to the sanitary condition of vessels before entering them, and if it be found that any vessel is infected they shall not enter it, under a penalty of $100 and removal from his office; and any master refusing to answer such inquiries, or giving false information, may be fined a sum not exceeding $500.

§ 1383. No person on board a vessel in which such disease exists, or whilst such ship is performing quarantine, shall be permitted to come on shore from such vessel without permission, under the penalty of fine and imprisonment at the discretion of the court; and any person going on board such vessel (except the health officer or visiting physician) and returning without such permission shall be liable to the same penalty.

§ 1384. The Governor of the State may, by proclamation, give such orders and make such regulations to prevent the spread of infectious or contagious diseases as he may deem proper, and any one violating the same may be fined or imprisoned at the discretion of any court of competent jurisdiction.

§ 1385. Violators of quarantine may be indicted in any county in which they may be found, and be fined in not exceeding $500, and imprisoned in the common jail at the discretion of the court.

§ 1386. Any physician or other person who shall conceal a case of small-pox or varioloid, by not giving immediate notice thereof to the proper authority, may be indicted and fined in not exceeding $500, or imprisoned at the discretion of the court.

§ 1387. All fines and forfeitures arising out of the violation of any of these regulations, may be applied in aid of the quarantine and sanitary laws, and toward the support of the poor.

§ 1388. The health officer or the authorized visiting physician of any port shall give a certificate of the performance of quarantine by any vessel to the master thereof under a penalty, for every refusal, of $100, and in case of such refusal, or there being no such health officer or physician, such certificate shall be granted by the constituted authorities of such port or place.

§ 1390. The ordinary of each county, or the corporate authorities of any town or city are authorized to provide a suitable hospital for those suffering from small-pox, and to furnish them with medical or other attention.

§ 1391. Such authorities may provide proper quarantine regulations to prevent the spread of the disease; provided that no person shall be forced to go to such hospital when properly provided and guarded at home. Said court shall pay any expense of such case.

§ 1393. The Governor is required to procure the necessary quantity

of genuine vaccine matter, and have the same transmitted to the ordinaries of each county for immediate use.

Illinois.

An Act to create and establish a Board of Health in the State. Approved May 25, 1877; *in force July* 1, 1877.

The Governor, with the advice and consent of the Senate, shall appoint seven persons, who shall hold office for seven years, to constitute a Board of Health. Provision that the term of one of the seven first appointed shall expire on the 30th day of December of each year.

The State Board of Health shall have charge of all matters relating to quarantine, and shall have power to make rules and regulations, and sanitary investigations for the preservation and improvement of the public health; and it shall be the duty of all police officers, sheriffs, constables, etc., to enforce such rules.

Penalties to be devoted to a special fund for the carrying out the objects of the law.

Board shall appoint a President and Secretary — the latter to receive a salary and expenses as fixed by the Board. No other member of the Board to receive compensation. Board to make an annual report to the Governor, including vital statistics, and such knowledge respecting diseases, and such instruction on the subject of hygiene, as may be thought useful for disseminating among the people.

A sum of $5,000, appropriated for salary of Secretary, expenses of the Board and all other expenses.

By article 14 of chapter 139 of the Revised Statutes, the supervisors, assessor and town-clerk of every town shall constitute a board of health, and on the breaking out of any contagious disease in their town or immediate vicinity, shall have power to make and enforce any rules and regulations tending to check the spreading of such disease, within the limits of such town, as they may think proper; they shall have power to shut up any house or place where any infected persons may be, and cause notices of warning to be put thereon; or remove such person to any pest-house, within the limits of such town, at the expense of the party so moved, if able to pay, or otherwise at the expense of the town. Nothing in this section to apply to any town, or part thereof, lying within the corporate limits of any incorporated city or village.

By chapter 24, article 5, section 75, the city council in cities, and president of the board of trustees in villages, shall have power to declare what shall be a nuisance, and to abate the same, and to impose fines upon those who may create, continue or suffer nuisances to exist.

And by sections 76, 77 and 78, to appoint a board of health, and prescribe its powers and duties; to erect and establish medical dispensaries, and do all acts necessary for the promotion of health, etc.

IOWA.

By the public statute law of Iowa, title 1, chapter 10, section 525, the city council or the trustees of incorporated towns shall have power to establish a board of health, with all powers and duties specified in sections 415–419 of the ninth chapter of this title, viz., respecting nuisances, sources of filth, and causes of sickness. Notice of such regulations to be published in a newspaper published in the city or township, or where there is no newspaper, by posting in five public places therein. The trustees or council may order, in writing, the owner or occupier to remove any nuisance, source of filth, or cause of sickness found on private property within such time as they may deem reasonable, under a penalty not exceeding $25 *per diem* during which he knowingly permits such nuisance, etc., to remain after time prescribed for its removal. If order not complied with, the trustees or council may order the removal at the expense of such owner or occupier.

Power is given to trustees, etc., to employ all such persons as shall be necessary to carry such orders into effect, and to fix their compensation; to employ physicians in case of poverty, and to take such action as they may deem necessary for the preservation of the public health.

Any person willfully violating any of the regulations shall be guilty of a misdemeanor, and shall be liable to a fine not exceeding $100, and imprisonment not exceeding thirty days. The city council is also empowered to establish a city watch, or police, to organize the same under the general supervision of the mayor, etc.

In establishing boards of health, etc., as here provided, the city acts as a *quasi* sovereignty, and is not responsible to individuals for the neglect or non-feasance of its agents or officers in executing the powers so conferred. *Ogg* v. *City of Lansing*, 35—495.

By section 393, title IV, chapter 9, the township trustees are the board of health, and shall have charge of all public cemeteries within the township when the same is not controlled by other trustees or incorporated bodies.

State Board of Health.

By statute, title XI, chapter 8 (18th General Assembly, chapter 151), section 1, the Governor, with the approval of the Executive Council, shall appoint nine persons, one of whom shall be the Attorney-General of the State, one civil engineer and seven physicians, who shall constitute a State Board of Health, to hold office for seven years, the terms of office of the seven physicians first appointed being so arranged that the term of office of one shall expire on the 31st day of January of each year.

§ 2. State Board of Health shall have charge of all matters of quarantine, shall make such regulations as they deem fit and such sanitary investigations as they may deem necessary for the public health.

§ 11. Board shall make a biennial report to the Governor

§ 12. Provides for remuneration of officers.

§ 13. The mayor and aldermen of each incorporated city, the mayor and council of any incorporated town or village, in the State, or the trustees of any township shall have all the powers and perform all the duties of a board of health within the limits of the cities, towns and townships of which they are officers.

§ 14. The physician appointed by the local board shall be the health officer within its jurisdiction.

§ 15. At least once a year such physician and the clerk of the board of health shall report to the State Board of Health their proceedings.

§ 16. Local boards of health shall make such regulations respecting nuisances, sources of filth and cause of sickness within their jurisdiction, and on board any boat in their ports or harbors, as they shall judge necessary for the public safety, and any person violating such shall be liable to a penalty of not less than $25 for every day during which he knowingly violates or disregards the same.

Other classes follow identical with those previously referred to under title I, chapter 10, with the addition of the power to remove the occupants of any condemned building by force and close up the premises, not again to be occupied as a dwelling place without the written sanction of the board.

§ 20. Where board of health is refused admission to any place, etc., a justice may issue his warrant to the sheriff, etc., to enter by force and remove, destroy and prevent such nuisance, source of filth or cause of sickness, under the direction of two or more members of the board of health as are required to accompany him.

§ 21. Care of any infected person coming from abroad, or residing in any city, etc., within the State, or who shall have lately been infected with small-pox or other dangerous sickness, shall be taken by the board of health, who shall remove him to a separate house, if such can be done without damage to his health, and provide proper nurses and supplies at the expense of the county to which he belongs, if himself, his parent or other person liable for his support are unable to discharge the same.

§ 22. If he cannot be removed without damage to his health, the board shall make provision for him in the house in which he may be.

§ 23. Any justice of the peace may, upon application by a local board or any member thereof, issue his warrant for the removal of any person suffering from infectious or contagious disease, or to take possession of condemned houses and lodgings, and to provide nurses and attendants and other necessaries for the care, safety and relief of the sick.

§ 24. Clerk of each board of health shall transmit his annual report to the Secretary of the State Board of Health within two weeks after the November meeting, being required to meet on the first Monday in May and first Monday in November in each year. Such report shall embrace a history of any epidemic which may have prevailed within

his district. The failure of the clerk to forward such report shall be considered a misdemeanor, subject to a fine of not more than $25.

§ 25. All laws in conflict with this act are repealed.

By statute, title XXIV, chapter 10, the selling unwholesome food, adulteration of food or liquor, drugs or medicines, neglecting to label poisons, inoculating with small-pox with intent to spread the disease, selling druged liquors, throwing dead animals into any river, well, spring, stream, etc., selling diluted milk, or using poisonous material in making cheese or butter, manufacturing for sale, or exposing for sale, oleomargarine without being labeled as such, is strictly forbidden under penalty of fine or imprisonment, and in the last-defined offense the offender shall be guilty of a misdemeanor. (18th General Assembly, chap. 39.)

Also the manufacturing and selling lard rendered from swine that have died of disease, without having first labeled the cask, barrel, etc., containing it accordingly, or, if sold without casks, barrel or other receptacles, without having informed the purchaser that the lard is from hogs who have died of disease, is punishable with fine or imprisonment. (18th General Assembly, chap. 137.)

By the Revised Code of Iowa, title XI, chapter 6 (chap. 151, Laws of 1880), it is enacted that the Governor, with the approval of the Executive Council, shall appoint nine persons, one of whom shall be the Attorney-General, one a civil engineer, and seven physicians, who shall constitute a board of health, to hold office for seven years —*provided* that the terms of office of the seven physicians first appointed shall be so arranged by lot that the term of one shall expire on the 31st of January of each year — vacancies to be filled up by the Governor, etc., as before. State Board shall have charge of all matters relating to quarantine, shall have authority to make such rules and regulations and such sanitary investigations as they may deem necessary; and it shall be the duty of all public officers, etc., to enforce such rules, etc. They shall elect a Secretary, who shall receive a salary not exceeding $1,200 per annum and other expenses, but no other member of the Board shall receive a salary.

Board shall make a biennial report to the Governor, including information relating to vital statistics, and such knowledge respecting diseases and instruction on the subject of hygiene as may be thought necessary. The sum of $5,000 appropriated for salary of Secretary, his contingent expenses and the expenses of the Board.

The mayor and aldermen of each incorporated city, the mayor and council of any incorporated town or village in the State, or the trustees of any township, shall have and exercise all the powers and perform all the duties of a board of health within their respective limits.

Every board of health shall appoint a competent physician to the board as health officer. The local boards of health shall report at least once a year to the State Board. They shall make such regulations respecting nuisances, sources of filth, and causes of sickness within their jurisdiction, and on board any boats in their ports or

harbors as they shall judge necessary. They may order any owner of any property to remove (at his own expense) any nuisance, sources of filth or cause of sickness, within any reasonable time, and if owner or occupier neglects, he shall forfeit not exceeding $20 for every day during which he knowingly and willfully permits such nuisance, etc., to remain. And the board may cause the nuisance, etc., to be removed, and all expenses incurred shall be paid by the owner, occupier, etc., to be recovered by civil action in the name of the State.

Board to have power to purify dwellings, or may require occupants to quit the premises until such time as the board shall grant permission, in writing, for the re-occupation of premises. Board possesses power to enter any place, building or vessel in their township to prevent or remove any nuisance, source of filth or cause of sickness, and upon complaint of refusal to permit such entry, any justice of the peace of his county may issue his warrant directing the destroyal, removal or prevention by the sheriff or constable, etc., under the personal direction of two or more members of the board.

Board may make such provision as they may think fit by removing any person lately infected with small-pox, or other dangerous sickness, to a separate house, if possible, and by providing nurses and supplies, charged to him or those liable for his support, if able, otherwise at the expense of the county to which such sick person belongs. If such person cannot be moved without damage to his health, like provision shall be made for him in the house in which he may be.

Any justice of the peace, on application by the local board or any member thereof, shall issue his warrant directing, under the direction of the board of health, the removal of any person infected with contagious diseases, or requiring the sheriff, etc., to take possession of condemned houses and lodgings, and to provide nurses and attendants and other necessaries for the care of the sick.

By section 525, chapter 10, title VI, the city council of any city shall have power to establish such a board of health as above specified. And by section 415, chapter 9, title IV, township trustees shall have power to make whatever regulations they deem necessary for the protection of the public health, and respecting nuisances, sources of filth, and causes of sickness within their respective townships — *provided* that their jurisdiction shall not extend to any city or incorporated town situated therein. The same powers are conferred by the subsequent sections as those described above, and any person willfully violating any of the regulations published by the trustees shall be guilty of a misdemeanor and subject, upon conviction, to a fine not exceeding $100 or imprisonment not exceeding thirty days. All expenses incurred by the trustees of a township in the exercise of their powers as a board of health shall be borne by the township.

Kentucky.

By the General Statutes of Kentucky, chapter 102, article I, section 1, any person willfully or designedly importing the small-

pox or any variolus or infectious matter of the said disease into this State, or causing the same to be done, shall forfeit the sum of $1,000.

By article II, all persons of and above twenty-one years of age who have not been vaccinated, or not successfully, shall within three months after this revision procure their own vaccination or re-vaccination.

And all parents and guardians of minors shall have the same vaccinated, and any parent or guardian of a child born hereafter shall have the same vaccinated within twelve months after its birth, or after it comes under his or her custody.

Persons coming from abroad, if not before vaccinated, shall procure the vaccination of themselves and children within six months after coming into the State.

Practicing physicians shall be appointed in each district to vaccinate the poor — his charges to be paid out of the county levy.

City council of every city, and the board of trustees of every town, are invested with power, and required to make such regulations, with fines and penalties attached, as will secure the vaccination of all the inhabitants of such cities and towns.

All vaccinations with pure vaccine.

Each person, for every failure or refusal to comply with the requirements imposed, shall be fined not less than $5 nor more than $20 for each failure or refusal.

Each justice of the peace, member of a city council or of a board of trustees of a town, and every physician, superintendent of a charitable institution, and keeper of the penitentiary, for every failure or refusal to perform the duties of his office, shall be fined not less than $20 nor more than $50.

By article III, patients in hospitals having small-pox are prohibited all intercourse with others not so infected, and are not to be discharged until thoroughly cleansed, under a penalty of $10.

Persons never having had small-pox, and going into an infected place shall be sent to a safe place, and not discharged except upon certificate of physician.

Any person willfully endeavoring to spread the infection shall be subject to a fine of $500 or imprisonment for six months.

And further, any person, believing himself at the time to be suffering from small-pox, who shall go upon any public highway or street or to any place of public assembly, or who shall go on board any steamboat, railway car, or other public conveyance, and all persons knowingly aiding or assisting any one thus to offend shall be guilty of a misdemeanor, and upon conviction shall be fined not less than $100 nor more than $1,000.

LOUISIANA (INCLUDING NEW ORLEANS).

On arriving at the quarantine grounds below New Orleans and waiting there a day, a ship, no health officer appearing, without any effort to procure one, ascended the river. On nearing the river she was boarded by the boarding physician, who reported to the Board

of Health that she was in a filthy condition, and that there had been several deaths on her by pestilence.

The Board thereupon compelled her to return to quarantine. *Held*, the ship can recover no damages, having assumed the risk of being compelled to return; nor will a court interfere without conclusive proof of the illegal exercise of a discretion confided to sworn officers. *Rudolphe* v. *New Orleans*, 11 A. 242.

By act 8th of February, 1858, No. 4, the United States were granted the use of land at the quarantine station to construct warehouses; and by act of 18th March, 1858, No. 215, the property so granted was exempted from taxation, State or municipal; 1855, Nos. 11, 336, to which the act of 18th March, 1858, No. 269, is supplementary.

The quarantine act, 1855, s. 13, No. 336, defines a certain offense to consist, among other things, in the bringing of a ship from a place proclaimed by the Governor of the State to be infected. *Held*, that it suffices for an information to aver, that the ship came from "*an infected place*" without averring that she came from "*a place proclaimed by the Governor of the State to be infected.*" And yet the only evidence admissible under the statute to prove the infectious character of the ship's port of departure is the Governor's proclamation. *State* v. *Patterson*, 14 A. 46.

Where, in an action to recover fees of inspection under the quarantine act of 15th March, 1855, No. 336, the question presented was, not whether the act be constitutional, but whether the Board of Health was authorized by the statute to charge fees for the inspection of vessels at any other station than that on the river Mississippi, an appeal from the judgment therein rendered was dismissed. *Board of Health* v. *Pooley*, 11 A. 743.

The sanitary commission appointed by the Board of Health can claim no compensation from the city. First, because they acted as agents, and the law presumes, gratuitously. Second, because if they were officers, this was a public trust, without fees. Third, because there was no agreement on the part of the city to pay. *Barton et als.* v. *New Orleans*, 16 A. 317.

The State has the right, in the exercise of its police powers, to pass a law ordering all indigent cases of small-pox to be sent to a designated locality at the expense of the local authorities. *State, ex rel. J. J. Hayes*, v. *City of New Orleans*, 27 A. 522. Act No. 60 of 1872.

MAINE.

By the Revised Statutes of the State of Maine, passed January 25, 1871, title II, chapter 14, sections 34, 35 and 36, a town may choose a board of health of not less than three, nor more than nine persons, who shall have all the powers, and be subject to all the duties, restrictions, liabilities, and penalties of the municipal officers, and health committee or officer.

A town may provide for the inoculation of its inhabitants with the cow-pox, under the direction and control of the health com-

mittee, health officer, or board of health; and raise all necessary sums to defray the expense thereof, or such part as they may think proper.

Towns may establish by-laws for the preservation of health, and for protection against infectious diseases.

By this same chapter, extensive powers are given to municipal officers, and their duties are fully defined in connection with contagious and infectious diseases. To them is granted the power to remove infected persons and goods; or to impress and take up convenient houses, lodgings, nurses, attendants, and other necessaries for the accommodation, safety, and relief of the sick. Compensation to the parties interested to be paid by the town.

By section 14, a town, at its annual meeting, may choose a health committee of not less than three nor more than nine, or one person to be a health officer; who shall remove, at the expense of their town, all filth found in any place therein, which, in their judgment, endangers the lives or health of any inhabitant, and require the owner or occupant, when they think necessary, to remove or discontinue any drain or other source of filth. And, by section 15, if no such committee or officer be chosen, the municipal officers shall be a health committee, and have all their power, and perform all their duties.

By section 20, the municipal officers of a seaport town may make such regulations as they may deem expedient respecting the performance of quarantine by any vessel arriving in their port; and whoever neglects or refuses to obey such regulations shall forfeit not exceeding $500, or be imprisoned not exceeding six months.

By section 21, if any pilots of such port shall neglect to make known the notice received from such municipal officers, respecting the performance of quarantine, to the master of all vessels which they board, or contrary thereto shall pilot any vessel up to said seaport town, he shall forfeit not exceeding $100.

And by section 22, if the master of a vessel fraudulently attempts to elude such directions, after notice, or lands, or suffers to be landed from his vessel, any person or thing, without permission of the municipal officers, he shall be punished as provided by section 20.

By section 24, in every seaport town where there is a health committee or officer, he may perform all the duties, and exercise all the authority of the municipal officers, in requiring the vessels to perform quarantine.

By section 26, a town may establish therein one or more hospitals, for the reception of persons having the small-pox or other disease dangerous to the public health; or the municipal officers may license any building for that purpose, under their control; but no such hospital shall be within one hundred rods of an inhabited dwelling in an adjoining town, without the consent of its municipal officers.

By section 27, if any person inoculates himself, or suffers himself to be inoculated with the small-pox, unless at some lawful hospital, he shall forfeit not exceeding $100.

By section 29, all temporary hospitals shall be subject to the regulations of the municipal officers the same as established hospitals, and where the sick cannot be removed without imminent danger, the house where the sick is shall be deemed a hospital, and subject to hospital regulations.

By section 31, any physician or other person in such hospital violating any lawful regulation in relation thereto, shall forfeit not less than $10, nor more than $100 for each offense.

By section 32, when a householder or physician knows that a person under his care is taken sick of any such disease, and fails to give notice thereof to the municipal officer, he shall forfeit not less than $10, nor more than $30, and all forfeitures shall inure to the use of the town where the offense is committed.

MARYLAND.

By statute of this State (A. D. 1880) chapter 438, a State Board of Health is established consisting of seven members, one of whom shall be a civil engineer and three experienced physicians to be appointed by the Governor, with the advice and consent of the Senate, and a Secretary, who together with the Attorney-General and the Commissioner of Health of the city of Baltimore, the last two being *ex-officio* members, shall constitute the said Board. Those members so appointed by the Governor shall hold office for four years, provided that the term of office of two shall expire on the last day of January in every second year.

The Board shall make sanitary investigations respecting the causes of disease, etc., shall inquire into all nuisances affecting the public health in any county, city or village in the State, and may apply for an injunction to restrain and prevent any such nuisance, no matter by whom or by what authority committed.

They shall organize, as far as possible, in every city, village, and legislative district local boards or advisory committees, to serve without pay, to assist the Board and make quarterly reports to the Board. In the event of an epidemic occurring in any county, city or village, said Board may take all necessary precautions and adopt any sanitary measures which may be consistent with law.

The Secretary shall be an experienced physician. He shall keep a record of all proceedings and shall, when directed by the Governor, make special inspections of public hospitals, asylums, prisons, etc., and advise generally, and collect information respecting vital statistics, and the general hygiene of the State. He shall be constituted the superintendent of vital statistics.

No member of the Board, except the Secretary, shall receive any compensation, but the actual personal expenses when engaged in duties of the Board.

MASSACHUSETTS.

Statute 1832, chapter 150, authorized the selectmen of Charlestown to appoint and locate burying places in that town, to establish the

police of the burying places, to make regulations for funerals, and to appoint proper persons to carry the same into effect. Section 4 of a by-law of Charlestown provided that no person should, without leave first obtained, bring into the town any dead body, or convey through any of the streets, or bury, any dead body so brought into the town, or bury any such body in any part of his own premises or elsewhere. *Held*, that the first part of this section being unauthorized by the statute and void (which was conceded), the whole was therefore void; and also, that it was itself a prohibition, and not a regulation, and unreasonable and void. *Austin* v. *Murray*, 16 Pick. 121 (1834).

The by-laws and ordinances of the city of Boston concerning burying grounds are regulations relating to health within statute 1849, chap. 211, § 7. *Commonwealth* v. *Fahey*, 5 Cush. 408 (1850).

The General Statutes of Massachusetts, A. D. 1860, relating to the preservation of the public health (chap. 26), and to cemeteries and burials (chap. 28) contain the following provisions:

§ 1. Towns, respecting which no provision is made by special law, may choose a board of health, or health officer. If no board or officer is chosen, the selectmen shall be the board of health.

§ 2. Except where otherwise provided the city council of a city may appoint a board of health. In default of the appointment of a board of health with full powers, the city council shall have the powers and perform the duties prescribed to boards of health in towns.

§ 3. Every board may appoint a physician to the board, who shall hold his office during pleasure.

§ 4. The board shall establish the salary or other compensation of such physician, and shall regulate all fees and charges of persons employed by it.

§ 5. The board shall deal with nuisances, filth and causes of sickness, within its own town or on board of vessels within its harbor with a view to the prevention or spread of contagion or infection. Penalty for violating any of its regulations, not exceeding $100.

§ 8. Powers are given for examining all nuisances, etc., and ordering their removal within twenty-four hours or other reasonable time, and if the owner or occupant of private property on which such nuisances, etc., are found neglects to remove the same, he shall forfeit not exceeding $20, for every day during which he knowingly permits such nuisance, etc., to remain.

§ 10. If owner or occupant fails to comply, the board may cause the nuisance, etc., to be removed at the expense of such owner, occupant, or other person who caused or permitted the same, if he has had actual notice from the board of its existence.

§ 11. Board may notify the occupants, or any of them, of any cellar, room, tenement or building in its town, to quit and the premises to be put into a proper condition as to cleanliness, and if the persons so notified neglect or refuse to comply with the terms of such notice, the board may cause the premises to be cleansed at expense of the owners, and remove the occupants forcibly, and close

up the premises. If the owner knowingly afterward occupies or permits the same to be occupied without the consent of the board in writing, he shall forfeit not less than $10 nor more than $50.

§ 12. When a person is convicted upon indictment of a common nuisance, the court may order it to be removed or destroyed at the expense of defendant, under direction of board of health.

§ 14. If the entry of board into any land, building, or vessel within its town be opposed, two justices of the peace of the county may issue a warrant directing the sheriff to repair to the place and destroy, remove or prevent the nuisance complained of.

§§ 15, 16. Permits for removal of any nuisance, infected article, or sick person, and a provision for the removal of such person to a separate house, etc., and for nurses and other assistance and necessaries may be made by the board, and charged upon sick person, his parents or master, if able; otherwise at the charge of the town, or if he be not an inhabitant of any town, at the charge of the Commonwealth.

§ 17. If infected person cannot be removed without danger to his health, provision to be made for him in the house in which he is.

§ 18. Travelers may be intercepted and examined by persons appointed for that purpose by any board of health of a town near to or bordering on either of the neighboring States, if suspected of bringing from infected places of other States any infection dangerous to the public health; and if need be, they may be restrained from traveling until licensed thereto by the board of health of the town to which they may come. A traveler from such infected place who shall without such license travel within this State (except to return whence he came, by the most direct way) after caution shall forfeit a sum not exceeding $100.

§ 19. Two justices of the peace may, if need be, issue a warrant directed to the sheriff, etc., or any constable requiring them to remove any infected person, or to impress and take up convenient houses, lodging, nurses, attendants and other necessaries, for the accommodation and relief of the sick.

§ 20. Any baggage, clothing or goods suspected of being infected may be secured under justice's warrant, and persons may be prevented from removing or coming near the same until due inquiry is made into the circumstances.

§ 21. Under the same warrant officers may be required, under direction of the board, to impress and take up convenient houses or stores for the safe-keeping of such articles, and the board may direct their detention, until in its opinion they are freed from infection.

§ 22. Officers in execution of the warrant may break open any house, shop or other place mentioned in warrant where such articles are. And whoever neglects or refuses to assist them shall forfeit a sum not exceeding $10.

§§ 23, 24. The board may determine the prices and rates to be charged for securing, transporting and purifying such articles, which charges shall be paid by the owners. The parties interested shall,

however, be entitled to a just compensation therefor, to be paid by the town so impressing, etc.

§ 25. If any prisoner or inmate of work-house has a disease in the opinion of the physician of the board dangerous to health of other prisoners or of the town, the board shall direct the removal of such person to a hospital or other place of safety, there to be provided for and kept in security until recovery, to be then returned to prison or other place of confinement.

Vaccination.

§ 27. Parents and guardians shall cause their children and wards to be vaccinated before they are two years of age, and re-vaccinated whenever the selectmen or mayor and aldermen shall after five years require it.

§ 28. These authorities shall enforce the vaccination of all the inhabitants, and, whenever they think the public health requires it, the re-vaccination of all the inhabitants who do not satisfy them that they have been successfully vaccinated or re-vaccinated within five years. All persons over twenty-one years of age, not under guardianship, who neglect to comply with such requirement, shall forfeit $5.

§ 29. Towns shall furnish means of vaccination to such as are unable to pay for the same.

§ 30. Incorporated manufacturing companies, superintendents of alms-houses, and other charitable institutions, etc., keepers of prisons, etc., or officers of all other institutions supported or aided by the State, shall at the expense of their respective establishments cause all inmates thereof to be vaccinated immediately upon their entrance thereto, unless they produce sufficient satisfactory evidence of previous sucessful vaccination within five years.

Quarantine.

§§ 34, 35, 36. The board of health in each seaport town may from time to time establish the quarantine to be performed by vessels arising within its harbor, and may make such regulations as it deems necessary, extending to all persons, goods and effects arriving in such vessels, and to all persons visiting or going aboard such vessels, and whoever violates such regulations, after notice, shall forfeit a sum not less than $5 nor more than $500.

§§ 37, 38. The board in each seaport town may cause any vessel arriving in such port, when such vessel or its cargo is, in its opinion, foul or infected, to be removed to the quarantine ground and thoroughly purified at the expense of the owners, consignees or persons in possession, and may cause all persons arriving at or going on board to be removed to a hospital under care of the board. If any master, seaman or passenger belonging to any vessel on board of which any infection is or has been, or is suspected to have been, or which has come from any port where any infectious distemper

prevails, refuses to answer on oath to inquiries made of him relating to such infection or distemper by the board of health of the town to which such vessel may come, such master, seaman or passenger shall forfeit a sum not exceeding $200, and if not able to pay, shall suffer six months' imprisonment.

§ 39. All expenses incurred on account of any person, vessel or goods under quarantine regulations shall be paid by such person or the owner of such vessel or goods respectively.

Hospitals and Dangerous Diseases.

§ 40. Any town may establish one or more hospitals for diseases dangerous to the public health.

§§ 41, 42. Such hospitals shall be subject to the regulations of the board, or of a committee of the town, and not within one hundred rods of an inhabited dwelling-house in an adjoining town, without the consent of such town.

§ 43. The physician, nurses, attendants, the sick therein, and all persons approaching or coming within the limits of the same, and all furniture and other articles used there shall be subject to the regulations of the board of health, or the committee appointed for that purpose.

§ 44. Board may cause any person suffering from a disease dangerous to the public health, to be removed to any such hospital, whether temporary or permanent, and if such person cannot be removed without danger, the house or place in which he remains shall be considered as a hospital, and subject to the regulations of the board of health, or the committee as aforesaid.

§ 45. The selectmen and board of health shall give public notice of infected places in the town to travelers, by displaying red flags at proper distances, and by all other means in their power.

§ 46. If any person, in any of the hospitals or places of reception, violates any of the lawful regulations, he shall for each offense forfeit not less than $10 nor more than $100.

§ 47. If a householder knowingly neglects or refuses to give notice to the authorities, as aforesaid, that a person within his family is taken sick of small-pox, or any other dangerous disease, he shall forfeit a sum of not less than $100.

§ 48. And a physician, neglecting to give notice of any patient of his suffering from small-pox, etc., shall forfeit for each offense a sum of not less than $50 nor more than $100.

§ 49. Expenses incurred by a *town*, in the removal of nuisances or preservation of the public health, and which are recoverable by law, may be sued for and recoverable in an action of contract.

§ 50. Fines and forfeitures, incurred under by-laws and regulations of a *town* relating to health, shall inure to the use of such town.

§ 51. Provisions of sections 16, 17, 44, 45 and 46 shall not apply to small-pox.

Offensive Trades.

§ 52. The board shall, from time to time, assign certain places for the exercising of any trade or employment which is a nuisance or dangerous to the public health, or hurtful to the inhabitants, and may prohibit the exercise of it elsewhere within the limits of the town.

§ 53. Supreme Court may, on complaint, revoke such assignment.

§ 55. Board empowered to serve orders, under section 52, of prohibition, etc., upon occupant or person in charge of premises. If party so served refuses or neglects for twenty-four hours after service to obey the same, board shall take all necessary measures to prevent the exercise of such trade, etc., and persons so refusing, etc., shall forfeit not less than $50 nor more than $100.

§§ 56, 57. Appeal allowed within three days, but such trade, etc., shall not be exercised during the pendency of the appeal.

§ 58. Provisions made as to costs.

CHAPTER 28.

Of Cemeteries and Burials.

§ 6. Boards of health may make all regulations which they deem necessary concerning burial grounds and interments within their respective limits; may prohibit the use of tombs by undertakers (as places of deposit for bodies committed to them for burial), for the purpose of speculation, and may establish penalties not exceeding $100, for any breach of such regulations.

§ 7. Legal notice of such regulations shall be publicly given.

§ 8. Before a tomb, burial ground or cemetery is closed by order of the board of health, for a longer time than one month, all persons interested shall have an opportunity to be heard, and personal notice of the time and place of hearing shall be given as therein described.

§ 9. Appeal allowed therefrom to Superior Court at any time within six months from the date of the order. But order of the board shall remain in force until decision had on the appeal.

§ 10. If order is sustained, the appellant shall be liable for double costs in favor of the board of health for the use of the town or city.

A. D. 1871 — CHAPTER 167. (Supplement to General Statutes.)

An Act concerning Slaughter-houses and Noxious and Offensive Trades.

§ 2. Whenever in any city or town, containing more than four thousand inhabitants, the State Board of Health order any person or persons or corporation carrying on the business of slaughtering cattle, sheep or other animals, or for melting or rendering establishments, or for other noxious or offensive trades in any building or premises to desist and cease from carrying on such trades, etc., and any such persons continue, notwithstanding such order, to carry on such trades

or occupations in such forbidden building or premises, they shall forfeit not exceeding $200 for every month they continue so to occupy the premises for that purpose after being ordered to desist, and in like proportion for a shorter time; *provided* that, on application to the Board to exercise such powers, a time and place for hearing the parties be assigned by said Board, and due notice given thereof, and the aforesaid order only be issued after such notice and hearing.

§ 3. The Supreme Judicial Court, or any one of the justices thereof, in term time or vacation, shall have power to enforce the orders of the State Board of Health issued under section 2 of this act.

The State Board of Health, referred to as above, is authorized to be established under act (A. D. 1869), chapter 420, and is as follows:

SECTION 1. The Governor, with the advice and consent of the Council, shall appoint seven persons, who shall constitute the Board of Health and Vital Statistics. The persons so appointed to hold their offices for seven years; *provided* that the terms of office of the seven first shall be so arranged that the term of one shall expire each year, and all vacancies, in whatever way occurring, be filled by the Governor with the advice, etc., as aforesaid.

§ 2. The Board shall take cognizance of the interests of health and life among the citizens. They shall in the month of January in every year make report to the Legislature of their doings, investigations and discoveries during the preceding year, with such suggestions as to legislative action as they may deem necessary.

§ 3. No member, except the Secretary, shall receive any compensation, but the actual personal expenses of any member while engaged in the duties of the Board shall be paid.

§ 4. The Board shall examine and report upon the effect of the use of intoxicating liquors upon the industry, etc., health and lives of the citizens. Also what additional legislation, if any, is necessary.

§ 5. The Board shall elect a Secretary, who, when elected, shall be a member of the Board.

ACT 1870, chapter 365. The State Board of Health may order any person at any time, engaged in the business of slaughtering, within six miles of Faneuil Hall Market, Boston, and not upon any island in the harbor, to slaughter his cattle, sheep, or other animals, upon premises of the corporation of the "Butchers' Slaughtering and Melting Association," located in the town of Brighton, *provided* that thirty days' notice shall be given to such person by the Board, and if after such order said person shall continue to conduct his business in a way, in the judgment of the Board, injurious to the public health, Supreme Court or any justice thereof, sitting in equity shall have power to enforce any such order by injunction. Any person aggrieved by order of the Board shall have a right to appeal in the same manner as such right is given by chapter 26 of the General Statutes, to a person aggrieved by an order of a town board of health, prohibiting the carrying on of offensive trades.

CHAPTER 167. *An Act concerning Slaughter-houses, and Noxious and Offensive Trades.* See § 2.

Cases Cited.

1. The Legislature can constitutionally make the action of its delegate, in revoking a license, final, and not subject to be reviewed by a jury. Although the Mass. Stat. 1871, chap. 167, does not expressly give to a person aggrieved by an order of the State Board of Health, under section 2, adjudging his business to be a nuisance, a right of appeal therefrom to a jury, yet he has such right. *Sawyer* v. *State Board of Health*, 125 Mass. 182.

2. On such appeal from an order, prohibiting the business of "slaughtering and rendering," on certain premises, the jury may permit the business of "slaughtering" under restrictions, that the cellar be concreted in concave form, that no swine be kept within, and that all offensive matter be removed before a certain hour in water-tight boxes, and that the premises be kept in a condition of cleanliness acceptable to the local board of health; Mass. Gen. Stat., chap. 26, § 5, requiring the board to make such regulations as it deems necessary for the public health. Ib.

MICHIGAN.

When the board of health of a township necessarily incurs expenses in providing for the protection of its inhabitants against a sickness dangerous to the public health, by the removal of persons infected, to a building provided for them, such expenses are a charge against the county, which it is the duty of the board of supervisors to allow. *People* v. *Supervisors of Macomb*, 3 Mich. 475.

Boards of health to suppress nuisances, with full powers of enforcing ordinances for registration and mortuary statistics, provided that the same are not inconsistent with the rules and regulations of the State Board of Health and the laws of the State.

MINNESOTA.

By chapter 10, General Statutes, section 51 *et seq.*, the town supervisors constituted under this act (the Township Organization Act) shall constitute a board of health, and shall have and exercise all the powers necessary for the preservation of the public health.

Such board may examine into all nuisances, sources of filth and causes of sickness, and make such regulations as they may think necessary, and every person violating such rules, when duly published, shall be deemed guilty of a misdemeanor, and punished by a fine not exceeding $100, or by imprisonment in the county jail not exceeding three months.

Board shall order the owner or occupant of any private property on which any nuisance, source of filth or cause of sickness is found, to remove same within twenty-four hours, and if he neglects he shall forfeit not exceeding $50, to be recovered for the use of the town,

and the board of health may then remove the same at his expense, or at that of such other person as has permitted the same.

If board are refused admission to any building or vessel in their town for the purpose of examining and destroying, removing or preventing, any nuisance, source of filth or cause of sickness, a justice of the peace may, upon application, issue a warrant directing constables to accompany two or more members of the board, and, under their direction, to remove, destroy, etc. Infected person may be removed by direction of the board to a separate house with all proper appliances, at his charge or that of his guardians, if able, otherwise at the public expense.

Board shall provide hospital for sick and infected in case of epidemic, and may cause any sick or infected person to be removed there, if his health will permit it, otherwise the place where he remains shall be considered a hospital under regulations of the board.

By chapter 101, section 4, whoever inoculates himself or any other person, or suffers himself to be inoculated with the small-pox, with intent to cause the prevalence or spread of this infection, shall be imprisoned in the county jail not more than one year or by fine not exceeding $500.

MISSISSIPPI.

By chapter 32 (A. D. 1880), section 12, a chief health officer shall be appointed in each county in the State by the Governor, on the nomination of the State Board of Health, and who shall be a physician of sanitary attainments, whose term of office shall be for two years, subject to removal by the Governor, on the recommendation of the State Board of Health.

And by section 11, all incorporated towns shall have power to pass laws, and to create boards of health, to suppress nuisances, with full powers of enforcing ordinances for registration and mortuary statistics, *provided* that the same are not inconsistent with the rules and regulations of the State Board of Health and the laws of the State.

MISSOURI.

By article II of the Revised Statutes, chapter 89, sections 4586–9, 4590–3 (A. D. 1879), a health department shall be erected in all cities of the first class, which shall be managed, directed and controlled as provided by this article, and by ordinances of such city, by a board of health and by a health commissioner, who shall be appointed by the mayor and council. His tenure of office shall be four years, removable by the mayor.

There shall also be created a board of health, which shall consist of the mayor, the presiding officer of the council, a commissioner of police, and two regular practicing physicians. The health commissioner shall be an officer of the same board. Board shall meet twice in each week during the year. Three members shall constitute a quorum, and it shall have power to adopt rules and regulations for its government.

Health commissioner shall have general supervision over the public health, and he is empowered to make such rules and regulations, with the approval of the board, as will tend to preserve the public health, to enter into, or require any employee or police officer to enter upon and examine, in the day-time, all buildings, lots, and places of every description within the city, and report the condition thereof so far as the public health is concerned; to abate nuisances — but all condemnations must first be approved by the board of health, whose action shall be final. He shall obey all lawful orders of the board of health and shall annually report to the mayor.

Police officers are required, through their chief, to report to the health commissioner any nuisance or accumulated filth existing in the city.

The superintendents of the city hospital, the female hospital, the insane asylum, and of quarantine, when necessary, shall be under the general supervision of the health commissioner, and shall be appointed by the mayor, with the approval of the board of health.

Health commissioner shall have power to notify to owners of the existence of any nuisance or filth on their premises, after officially so declared of record by the board of health, to abate or remove the same. A fine not exceeding $500 may be imposed for disobedience to such notification, and the nuisance shall be abated and special tax bills rendered against the property, but the owners shall first have an opportunity to be heard before the health commissioner and the board of health, if they so desire.

Whenever the mayor shall have knowledge that any malignant, infectious or contagious disease or epidemic is prevalent in the city, or will probably become so, he may make proclamation to that effect, and after that the health commissioner, with the approval of the board of health, may take all steps necessary to suppress or mitigate such disease, and may employ officers, agents, nurses, servants, establish temporary hospitals, provide all things necessary, with the advice and counsel of the board of health, provided that the amount expended shall not exceed the appropriation for the health department.

NEW JERSEY.

By an act of the 104th Legislature of the State of New Jersey and thirty-sixth under the new Constitution, chapter 187, session of 1880, it is enacted that in any county of the State where there is by law a board of health and vital statistics, such shall be the only legally constituted body in said county, or in any municipality or town in said county, having power to make ordinances in relation to the public health or vital statistics.

County board may appoint health inspector, a graduated physician or chemist, who shall receive not over $1,500 a year as salary, and who shall be subject to the said board. Board shall also appoint a counselor at law at a salary of $1,000 a year, his office being tenable for two years, who shall bring and defend all suits and be the legal adviser of said board. Said board to have power to pass, alter,

amend or repeal ordinances in relation to public health and vital statistics in said county, to provide against

1. Adulteration of foods and drinks, or any kind of meat or vegetable not fit for human food, sold, exposed for sale, or brought into county for sale.

2. To declare what shall be nuisances, in lots, streets, docks, wharves, vessels, piers, and all public or private places.

3. To prevent the spread of dangerous, epidemic, or contagious diseases, and to declare when same has become epidemic.

4. To regulate the keeping of animals and the slaughter of the same.

5. To regulate, control or prohibit noxious or offensive trades, attended by noisome and injurious odors and otherwise injurious to property.

6. To regulate, license and control all night scavengers and their occupations.

7. To regulate, control and prohibit the accumulating of manure, compost, and all decaying or vegetable substances.

8. To prohibit and remove all or any nuisance, or offensive matter in any public highway, etc., or other place, public or private, at the expense of owner.

11. To regulate the keeping of a registry of the vital statistics of said county.

13. To secure sanitary condition of tenement-houses, prisons and all public buildings.

14. To regulate the cleaning of sewers, and the dumping of garbage, and the filling of sunken lots or marsh land.

15. To provide for filling in of sunken lots, the repositaries of stagnant water in the built-up portions of city.

Board of health may prescribe a penalty for violation of their ordinances, when the same has been duly published, not to exceed $100 and not less than $10. District Courts, justices of the peace, and recorders may issue process on oath, to hear and determine such cases. On failure to pay the judgment against him, together with costs, unless an appeal is granted, defendant to be committed to county jail for not exceeding ninety days, and if twice convicted in the space of six months, then in addition to the penalty, defendant to be imprisoned in county jail or work-house, with or without hard labor, for one day for each dollar of the penalty; all police officers, constables and health inspectors may arrest without warrant any person in their presence violating any of the ordinances of said board.

By chapter 220 of same act and session, it is enacted that the State Board of Health shall have power to determine whether pleuro-pneumonia, rinderpest, or any other contagious or infectious disease exist among animals, and that the sum of $500 be appropriated to defray necessary expenses of such examinations.

Owners of animals required to notify State Board of the existence of such disease; whereupon said animals shall be quarantined by said Board and remedial measures adopted.

Board, in its discretion, may order said animals to be slaughtered

and their remains buried not less than four feet under ground, and the places where they were kept to be cleansed and disinfected.

Two-thirds of the appraised value of such animals shall, in such cases, be paid to the owner.

Any person failing to notify said Board of the existence of such diseases shall be deemed guilty of a misdemeanor and be liable to be fined not more than $200, or be imprisoned not exceeding one year; both at discretion of the court; and further, any person knowingly buying, selling, or causing to be bought or sold, any animal affected as aforesaid, shall be deemed guilty of a misdemeanor, and be liable to a fine not exceeding $200, or imprisonment not exceeding one year; both at discretion of the court.

The following cases have been decided under the statutes of the State of New Jersey, defining the nature, character and powers of a board of health—the rights of citizens, notwithstanding—what constitutes a nuisance, and the mode to be adopted for its abatement, after being duly adjudged a nuisance, or by the contravention of some ordinance, defining and prescribing the mode in which any pursuit or calling may be used without incurring its condemnation as a nuisance, and inimical to public health.

The functions of a board of health are of an executive and advisory, but not of a legislative or judicial character. A resolution passed by said board declairing plaintiff's tannery to be a nuisance, is void. *State-Marshall* v. *Trenton*, 7 Vr. 283.

Nor can a city recover the expense of filling up low lands of a defendant; by the adoption of such a resolution by a board of health, and subsequent notification to the owner (the defendant) to do so. *Hutton* v. *Camden* (Nov., 1876), Court of Errors.

The board of health of the city of Newark, in the legitimate exercise of its powers, cannot absolutely prohibit the carrying on of a lawful business, not necessarily a nuisance, but which may be conducted without injury or danger to the public health, and without public inconvenience. They will be confined, in their interference with the lawful business of any individual, to such interruptions as may be reasonably necessary to enable them to abate any nuisance he may create in conducting it. *Weil* v. *Ruord*, 9 C. E. Gr. 169.

A tannery is not *per se* a nuisance, and cannot be abated by street commissioner or board of health, until adjudged to be so employed as to be inimical to public health or safety, or until the owners contravene some ordinance prescribing the mode in which it or any other calling shall be used, and thereby make them nuisances. *State-Marshall* v. *Cadwalader*, 7 Vr. 283.

STATE BOARD OF HEALTH OF NEW YORK.

CHAPTER 324 (April 10, 1850), entitled *An Act for the Preservation of the Public Health.*

SECTION 1. Local boards of health required to be appointed in cities and incorporated villages once in every year, where as yet no

board of health existed, consisting of not less than two nor more than seven persons, and a competent physician to be the health officer.

§ 2. The supervisor and justices of the peace, or the major part of them, of each town in the State, shall be a board of health for each year, whenever, in the opinion of the majority of them, the public good requires it; and they appoint a physician to be officer of health.

§ 3. The several boards of health now organized in any city or village, except in the metropolitan district, and the several boards of health constituted under this act, shall elect a president and secretary of such board, and it shall be their duty (1) to meet in their respective cities, villages and towns and fix and determine the period of quarantine to which vessels, vehicles or persons arriving in such city, etc., shall be subject, with power subsequently to reduce the period if they deem it right. (2) To prescribe the duties of the officer of health and fix the amount of his compensation. (3) To make orders and regulations concerning the place and mode of quarantine, the examination and purification of vessels and other craft not under quarantine; the treatment of vessels, articles or persons thereof; regulation of intercourse with infected places; the apprehension, separation and treatment of emigrants, etc., who shall have been exposed to any contagious or infectious disease; suppression and removal of nuisances, and all such other orders and regulations as they may deem necessary. (4) To regulate and prohibit and prevent all intercourse with houses and places and their occupants, in which there shall be any one suffering from infectious or contagious disease. (5) To procure suitable places for the reception of persons sick with the Asiatic or malignant cholera, or any other malignant infectious or contagious disease, and to procure for them, if necessary, proper medical treatment. (6) To publish, from time to time, all orders and regulations of general obligation, and to make, without publication, any orders in special and individual cases, concerning the suppression and removal of nuisances and other matters detrimental to the public health, and to serve copies thereof upon occupants of premises designated as nuisances. (7) To issue warrants to any constable within their jurisdiction to apprehend and remove such persons as cannot otherwise be subjected to the regulations; and to issue warrants to the sheriffs of their respective counties to aid; all of which officers shall possess power to execute the same. And, as added by section 1, chapter 559, Laws of 1870, to impose penalties for the violation of, or non-compliance with the orders, etc., and to maintain actions for their recovery not exceeding $100, in any one case, or to restrain by injunction or otherwise enforce, as may be.

§ 4. (As amended by chap. 790, Laws of 1867.) Every person willfully violating or refusing to obey any such order or regulation shall be deemed guilty of a misdemeanor, and on conviction shall be subject to fine or imprisonment, or both, such fine not to exceed $1,000, nor such imprisonment two years. And in case of of non-compliance with any order, etc., so served, as provided in subdivision

6 of section 3 of said act as amended, the board may lawfully enter upon any premises and remove the nuisance or other matter mentioned in the order, and any other nuisance, etc., found there existing; expense shall be a charge upon the occupant or occupants and may be sued for in the name of the board; and the judgment obtained shall be, if unsatisfied, a lien upon the premises, having preference over all other liens or incumbrances whatsoever, and the said board may cause the premises to be sold for satisfaction of such lien and the expenses of the sale at public auction of the premises, all proper notices of such sale having been duly given and published. (Then follows the definition of the rights and security of the purchaser of the said lien or judgment.)

§ 5. (As amended by chap. 761, Laws of 1868.) All expenses incurred by the several boards shall be a charge only on their respective cities, villages and towns.

§ 6. Persons supported at county poor-house, liable to be infected by any pestilence or infectious disease existing in such poor-house or in its vicinity, may, upon the physician of such county poor-house certifying that the health of such inmates is thereby endangered, be removed by the superintendent to such suitable place as may be designated by the board of health of the city, etc., within which such poor-house is situate, and shall be there maintained at the expense of the county and provided with all necessary medical attendance until returned or otherwise discharged.

§ 8. The city and county of New York are exempted from the provisions of this act. See *Rogers* v. *Barker*, 31 Barb. 447, limiting the power for the suppression of nuisances to the regulation of nuisances *per se*. Cannot abate a mill-dam. *Ib.* But see chap. 559, Laws of 1870, subd. 9 of section 3 of this act. As to right of trial by jury, see *Board of Health* v. *Heister*, 37 N. Y. 661.

"*An Act relative to the Public Health of the city of New York*" (1850, *chap.* 275).

SECTION 1. The legislative powers hitherto vested in the board of health, otherwise than as herein modified or altered, shall be vested in the mayor and common council of the city of New York.

§ 2. Mayor and common council shall be known as the board of health, of which ten members shall constitute a quorum.

§ 4. The president of the board of aldermen, the president of the board of assistant aldermen, health officer, the resident physician, the health commissioner and city inspector shall be the commissioners of health.

§ 5. The mayor and the commissioners shall render their advice to the board of health, and to the city inspector, in regard to all sanitary matters.

§§ 6, 7. Health officer though required to perform all the duties specified, and such other duties as the board of health or the mayor and commissioners shall lawfully require, may appoint a deputy, for whose conduct he shall be responsible.

§§ 8, 9. The resident physician shall visit all sick persons reported to the board, or to the mayor and commissioner, and shall perform such other professional duties as the board of health shall enjoin, and the health commissioner, under direction of the board of health, shall assist such physician.

§ 15. Board of health may appoint as many visiting, hospital and consulting physicians as they may deem necessary.

§ 16. The mayor, with the advice and consent of the board of aldermen, may appoint an inspector of vessels, who shall, under the direction of the mayor and the commissioners of health, or of the board of health, perform the duties required of him and receive the fees, as prescribed by the act.

§ 17. Such inspector, after having performed any service required of him, shall make an immediate report to the board of health, or to the mayor and the commissioners.

An Act to establish a State Board of Health.

PASSED May 18, 1880; three-fifths being present.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. Within twenty days after the passage of this act, the Governor, by and with the advice and consent of the Senate, shall appoint three State Commissioners of Health, two to be graduates of legally constituted medical colleges, of not less than seven years' practice in their profession. Said Commissioners, together with the Attorney-General, the Superintendent of the State Survey, and the Health Officer of the port of New York, who shall be *ex-officio* members of the State Board of Health; and three other persons to be appointed by the Governor, one of whom shall be a commissioner of health of the board of health of the city of New York, and the others shall be members or commissioners of health of regularly constituted and organized boards of health of cities of the State, shall constitute the Board of Health of the State of New York. Nothing in chapter 335 of the Laws of 1873 of the State of New York, or in laws amending the same, or in laws constituting boards of health in the various cities in the State, shall be construed to prevent the appointment of said commissioners of boards of health of cities; also members of Board of Health of State of New York, and no appointment to, or acceptance of an office thereof under this law shall be held to vacate any office previously held in any board of health of any city in this State.

§ 2. Said three State Commissioners shall hold office for three years, and whenever a vacancy occurs, the place shall be filled as in other cases provided by law, and the other Commissioners shall, from time to time, be designated by the Governor, as occasion may require, or as their places may be vacated in the Board by the expiration of their several terms of office.

§ 3. Board shall meet, at least, once in every three months, first

meeting being held in city of Albany within two weeks after the appointment of members of first Board, and each annual meeting within two weeks after the 1st of May, each year after the first. They shall elect annually a person of skill and experience in public health duties, and sanitary science, to be their Secretary and Executive officer, having all the powers of a member of the Board, with the exception of voting on matters relating to his own office and duties. He shall hold office for three years, removable for cause, after full hearing, by a majority of the Board.

§ 4. Board may appoint committees, to whom it shall delegate authority and power.

§ 5. Secretary shall receive an annual salary of $3,000 and necessary expenses.

§ 6. Board shall take cognizance of the interests of health and life, and shall make all proper investigations in respect to the public health. And all health officers and boards of health in the State shall communicate to the State all sanitary information, whether in reports or otherwise, as may be useful.

§ 7. State Board of Health shall regulate the transfer permits issued by local boards of health for the transportation of dead bodies which are to be buried beyond the limits of the counties where the death occurs. Coupons are required to be attached to such permits to be preserved by the person to whom such dead bodies are delivered for transportation.

§ 8. Governor may require the Board to examine into nuisances, and upon their report may order their abatement. Any violation of such order shall be held and punished as a misdemeanor.

§§ 9, 10. Local board may select any one of its officers as its representative on the examination of any nuisance. Persons may be engaged to render sanitary services, etc., and persons having charge of public structures shall permit and facilitate such examination. No more than $5,000 in any one year shall be expended for such special sanitary service.

§ 11. Annual report on 1st December in each year shall be made to the Governor of the State upon the vital statistics and sanitary condition of the State. Such report shall contain a detailed statement of the expenditure, but the total expenditure for any one year shall not exceed $15,000.

§ 13. Act to take effect immediately.

Cases Cited.

1. *Powers of board of health.*— Powers conferred on a board of health for such an important object as the preservation of the public health, should receive a liberal construction for the advancement of the ends for which they were bestowed. 1869, *Gregory* v. *New York*, 40 N. Y. 273.

2. The board of health of the city of New York have power to act upon a particular thing dangerous to public health, and cause it to be abated; but they have not power to assume, in advance, that

all the sinks and privies in that city are or will become nuisances or dangerous to the public health, and bind the city by a contract for the removal of their contents. *Ib.*

Although the power to "regulate" includes the power to prohibit a slaughter-house in a city, yet a power to "regulate and license" a business or trade confers no powers to tax it. The rules and regulations which a corporation may make in respect to business or trade, under its police power, are such only as have relation to the public health, morals, and order of the community. *Mühelbrink* v. *Long Branch Corners*, New Jersey Supreme Court, June, 1880.

Thos. J. Reed, Plaintiff in Error, v. *The People, Defendants in Error.*

It is only when a regulation of the board has been made and published that a person can be convicted, under fourth section of the act, of a misdemeanor, for its violation. An order of the board of health, made *ex parte* and adjudging certain premises to be a common nuisance, is not such a regulation as is contemplated by fourth section, and a failure to comply with such order does not subject the person offending to punishment for a misdemeanor, under section 4. These regulations are to be in the nature of laws prescribed and published in contradistinction to a judgment, sentence, decree or order, and contemplates the exercise of a power in its character, legislative rather than judicial. Parker's Crim. Rep., vol. 1, p. 481.

The People, ex rel. Savage, v. *The Board of Health of the City of New York.*

The board of health has no power to adopt a resolution declaring any trade or occupation carried on within the limits of the city, to be a nuisance without notice to the party conducting the same, and giving him an opportunity to be heard in his defense. 33 Barb. 344.

John Underwood, Appellant, v. *John Green, Respondent.*

To justify a conversion of plaintiff's property, under a city ordinance directing "all dead animals" * * * "to be forthwith removed and disposed of by removal beyond the limits of the city, or otherwise, so as most effectually to secure the public health," it must be shown that the dead animals removed were, or would become, in some way dangerous or deleterious to public health. 42 N. Y. Rep. 140.

On May 12, 1884, an act was passed by the State Legislature authorizing the board of health of the city of New York to designate and set apart on the water front on the east side of New York, one or more places of sufficient size for the temporary deposit of stable manure, north of Forty-second street. Act to take effect immediately. 107*th Session, chap.* 278.

Also, on May 31, 1884, an act was passed empowering the Governor in the exercise of his judgment, for the more speedy and economical suppression, or for preventing the spread of any infectious or contagious disease of domestic animals, to cause to be slaughtered and to be disposed of afterward any animal which, by exposure to infection or contagion, may be considered after examination to be liable to contract or to communicate the disease sought to be suppressed. Provisions for ascertaining and awarding the value of animals slaughtered are added. 107*th Session*, *chap.* 418.

PENNSYLVANIA.

1. To obtain a valid lien for the removal of a nuisance the Board of Health must strictly pursue the provisions of the act of 1818; there must be a complaint of two householders, and a warrant from a justice. *Baugh* v. *Sheriff*, 7 Phila. 82.

2. The Board have final jurisdiction in determining the fact of nuisance, which they order to be removed. *Kennedy* v. *Board of Health*, 2 Penn. St. 366.

3. The Board of Health have power to fence a lot, if necessary for the abatement of a nuisance. *Wistar* v. *Addicks*, 9 Phila. 145.

4. The power of the Board of Health does not extend to the removal of tenants, and the closing up of their houses, unless justified by the existence of pestilential disease. *Eddy* v. *Board of Health*, 30 Leg. Int. 392; S. C., 5 Leg. Gaz. 381.

5. A resolution declaring that a nuisance exists on a lot, north and south of Master, between Broad and Thirteenth streets, will not sustain a claim against a lot at the south-west corner of Thirteenth and Master streets. *Philadelphia* v. *Houseman*, 2 Phila. 369.

6. What will justify the hauling of a vessel to the wharf before being visited by the port physician. *Board of Health* v. *Micreken*, Purd. Dig., 10th ed., 1326.

7. The Board of Health may recover the expenses of healing sick passengers, though ordered to the hospital, before the oath is made. *Board of Health* v. *Cope*, Purd. Dig., 10th ed., 1327.

8. The action of a Board of Health, fixing the compensation of a physician, whom they were empowered to employ, is conclusive. *Williamsport* v. *Richter* 2 W. N. C. 682; S. C., 33 Leg. Int. 321.

RHODE ISLAND.

By the General Statutes of this State, title VII, chapter 35, sections 11 and 12, the several town councils and boards of aldermen shall be *ex-officio* boards of health in their respective towns, and may make such rules and regulations, not repugnant to law, as they shall judge proper for the preservation of the health of the inhabitants thereof, the prevention and abatement of nuisances, the promotion of cleanliness, the removal of the causes and the prevention of the introduction and spread of any contagious or infectious disease therein, either by removing the inhabitants of their respective towns, or for-

bidding or regulating ingress or egress of persons to and from the same, or any parts thereof, or otherwise; and, in case of seaport towns, by making rules and regulations respecting quarantine.

The penalties for breach of such rules and regulations shall not exceed $300 fine or six months' imprisonment for any one offense, unless otherwise provided by law, said fine to inure, one-half to the complainant and the other half to use of the town.

By title XIV, chapter 74, a fine of $400 is imposed upon every commander of any vessel which shall have any person on board sick of small-pox or any contagious or infectious distemper, or which has had any such sick person during the passage, or which shall come from any infected port, who shall anchor within one mile from any public ferry, pier or landing place, or permit any person on board to be landed, or any one to come on board without license first had and obtained from town council of such town where vessel shall arrive.

Such commander shall keep signals in the shrouds. Any person coming ashore from such vessel, without license, may be sent back or confined on shore, and shall be fined $40 and all expenses.

Town council shall send a physician or other suitable person to examine and make report of true state of such vessel, at the charge of the master or owner, and put some person in charge and effectually prevent any communication therewith, at the charge of the master or owner thereof.

Town council shall confine on board, or send to some hospital, all persons suffering or liable to suffer, until perfectly recovered and cleansed, or have passed a suitable quarantine; and also all persons who have gone on board without license, at the charge of such persons respectively.

Suitable persons shall be appointed to see that all goods, etc., in such vessel are properly cleansed before they are brought into any house, shop or warehouse; charges to be borne by the respective owners, and be a lien on such goods, etc.

All goods clandestinely landed shall be forfeited, one-third to use of the State, and two-thirds to use of the person suing for same.

Any person coming by land from any infected place into this State, within ten days from the time of leaving such infected place, shall be fined not exceeding $100, nor less than $10.

Every householder or person shall inform the town council of his town of any case of small-pox, etc., suspected or otherwise, in the place where he dwells, or forfeit $20 to use of the town.

When so notified, town council shall set a proper guard, and shall remove such person to hospital, or otherwise, until recovered and cleansed, or have performed quarantine.

Any person visiting infected houses without license shall forfeit for every such offense $20, and such person shall be confined for the purpose of purification, or have performed quarantine, at the discretion of town council.

Flag to be placed near entrance of infected house.

Every person convicted of willfully spreading small-pox or other infectious disorder shall be imprisoned for one year, and if any person shall die of such complaint, the person so convicted of willfully spreading the same shall be fined not exceeding $5,000 and be imprisoned not more than five years, nor less than one year.

Every physician, surgeon, or other person employed by any town council, as aforesaid, and neglecting his duty, shall for every offense be fined $40.

Town council may cause all persons living in an infected district to be removed, after due notice, at their own expense, unless they are unable to remove themselves.

Annual gratuitous vaccination shall be provided, and public vaccinators appointed.

The above act is amended by act of 1873, chapter 289, so far as relates to small-pox on land, but the enactments are substantially the same.

By General Statute, title XIV, chapter 75, "Of Quarantine," each seaport town may appoint a health officer, who shall visit all vessels subject to quarantine, to be paid by owners, agents or commanders of such vessels. Every commander of a vessel refusing to obey the rules and regulations respecting anchoring on quarantine ground shall be fined not exceeding $500, and not less than $20, and any person leaving any ship or vessel under order of quarantine, without permission of the health officer or town council, shall forfeit not exceeding $20, and may be returned on board.

Every person entering into city of Providence, village of Pawtuxet, or the compact part of the town of Cranston from any vessel bound to that port at any time while the quarantine regulations are in force, until such vessel has been visited and examined by health officer and permission granted, shall forfeit not exceeding $20, and may be returned to such vessel in case she is under quarantine.

TENNESSEE.

Corporate bodies are subject, as are natural persons, to general laws enacted to protect and promote the quiet, comfort, health and safety of the people, unless exempted by reason of express stipulation in their charters, or by reason of plain implication, from the nature of the privileges or franchises granted by their charter.

A corporation has the power by general ordinances to prevent the introduction of threatened disease or pestilence into the corporate limits, as small-pox and the like; but it cannot exclude particular persons. *Manchester* v. *Armstrong*, Nashville, 1874. To the powers expressly delegated are to be added those incidental powers necessary and proper to carry out the express powers. 2 Swan, 364; 9 Heis. 578.

The common law of England, so far as it is not inconsistent with the form of government and the nature of the institutions, and not changed by statute, is in force in Tennessee. Mar. and Yerg. 226;

2 Yerg. 35, 484; 2 Hum. 267, 493; 10 Yerg. 434; 9 id. 436, 310; 7 id. 127; 6 id. 334.

By the North Carolina Statutes of 1778, chapter 5, section 2; 1715, chapter 31, section 7, the General Statutes of England, enacted prior to 1607, and those relating to American colonies, were adopted in North Carolina, and continued in force in Tennessee, by the Session Act of 1789, chapter 3, and by the Constitutions of 1796 and 1834. 3 Yerg. 320; 1 id. 1, 291; 1 Over 144, 153; 2 Head, 320; 1 Hum. 77; 6 id. 29; 4 Hay. 271; 7 Yerg. 529; 9 id. 442; 2 Hum. 491; Meigs, 476; 3 Hum. 278; until repealed by the Code, 41, in the year 1858.

WISCONSIN.

Board of Health. 1. *Expense of Nursing, etc.*

The statute in respect to boards of health empowers them to remove a person sick with small-pox, or other infectious disease, to a separate building, and to provide nurses and necessaries for the person so removed; or if such patient cannot safely be removed, to make like provisions for him where he is (§§ 9, 10, chap. 32, R. S. 1858); but it does not make the public primarily liable, in either case, for the expense of nursing and necessaries. *Kollock* v. *City of Sevens Point*, 37 W. 348.

It will thus be seen that boards of health, whether specially constituted as such, or the governing bodies of cities, towns or villages, if clothed with the properties and powers of a board of health themselves, are legislative bodies and not merely ministerial or even judicial tribunals. It is conseqeuntly their duty to deliberate in determining and framing their by-laws, and to give all proper publicity to their rules and regulations. Their powers appear to be ample if only efficiently enforced, but a lack of moral courage to put the law in motion, or a neglect of those preliminary notices which the law requires, will render nugatory the best conceived theories or neutralize in practice the operation of the most beneficial institutions.

DRAINAGE, SEWERAGE AND TOPOGRAPHY.

REPORT

OF THE COMMITTEE ON DRAINAGE, SEWERAGE AND TOPOGRAPHY.

The work of the committee on drainage, sewerage and topography during the year 1885 has comprised investigations and reports on some twenty-eight cases, besides a number of others where advice has been given to localities on minor questions which did not appear to call for special examination, the facts being clearly set forth in the applications themselves.

The investigations covered by the following reports relate to cases in all parts of the State, in the counties of Westchester, Rockland, Dutchess, Albany, Fulton, Montgomery, Schenectady, Oneida, St. Lawrence, Cortland, Onondaga, Broome, Chemung, Schuyler, Livingston, Ontario, Monroe, Orleans, Wyoming, Niagara and Chautauqua. The subjects considered may be classified under the heads of drainage, sewerage and water supply.

Drainage.

The canals and public works relating thereto have, in certain places, caused saturated areas or swamp grounds, giving rise to malaria. This has been specially the case with regard to the prisms of the abandoned canals. The localities affected have appealed to the State Board of Health to examine the regions and determine, if possible, whether life and health were endangered by the condition of these public works, and if so, to advise a suitable remedy.

These investigations have involved, first, the determination of the existence of miasmatic disease to such a degree as to lead to the suspicion of some local cause or causes; second, the determination of these causes; third, the devising of an effectual remedy for removing the insanitary conditions when such existed.

If miasmatic disease was found and the conditions on which it depended seemed to be caused by works belonging to the State, the committee earnestly recommended that the State apply a remedy when one was easily available. There can be no question that at Elmira, Horseheads, Pine Valley, Havana and Rome, the swampy condition of the abandoned canal beds was endangering the health of the localities. Means were devised for the drainage of these old canals, and appropriation having been made by the Legislature upon these recommendations, the committee have given their advice

and assistance to the Superintendent of Public Works in carrying out the drainage plans which have resulted in marked sanitary improvements.

The work at Rome, Havana and Horseheads has not yet been completed. At Rome the fall of the ditch is so slight down the center of the canal, that the Board advised that the bottom of the ditch should be covered with plank and the sides two feet up with cobble stones. The fall of the ditch being only about six-tenths of a foot to a mile, the maintenance of the flow in it will depend upon the grade being kept even and perfect, and upon reducing the friction to a minimum. It was considered that this could best be accomplished in the manner described in the report, but owing to unusually high water this season the Superintendent of Public Works considered it best to postpone the planking and paving of the work to the coming year. The drainage works at Pine Valley and Havana will probably be complete before spring. At Elmira the water in the prism of the old canal was being seriously polluted by leakage from the State Reformatory sewer, which was so situated that a part of it could not be covered with earth. The Board having recommended the construction of a new sewer, and the Legislature having made the necessary appropriations, a sewer has been constructed by the Superintendent of Public Works, under the advice of the committee, but subject to the conditions imposed by the city of Elmira as respects the *kind* of sewer to be built and the *route* to be followed.

By order of the city council the sewer was made of cement pipe to conform to the other sewers of the city, but every effort was made, by inspecting the kind of cement used, to have the pipe of the best quality.

Under the law the city must agree to accept and maintain the sewer as a part of the city system giving the Reformatory the perpetual right to dispose of its sewage through this channel.

Another class of drainage examinations and reports have been made in connection with swamps, caused by building railroad embankments. Railroad corporations have sometimes created serious miasmatic conditions by the construction of their embankments. Where localities have felt endangered from this cause, appeal has been made to the Board, and the committee have caused examinations and reports to be made. Where the corporations were clearly at fault and a remedy available, the changes advised by the Board have usually been made. Other causes have been investigated and practical remedies devised for miasmatic conditions, produced by mill-ponds and tidal swamps.

SEWAGE DISPOSAL.

The question of sewage disposal in many of the towns and public institutions of the State has become one of increasing difficulty. In the treatment of these subjects large sanitary information and experience, as well as technical engineering knowledge is required.

The *water* of the sewage after flowing through the sewers must eventually be returned to some one of the natural water-courses of the region. The interest of all those on the lower part of this water-course require the maintaining of the stream in a practically unpolluted condition. The amount of contamination which may be permitted in any stream depends upon the purpose to which it is put, the physical condition of its channel, and the population along its banks.

It is clear that the water of the sewage must be turned into lakes or streams; but before such discharge the sewage should be so treated that no sanitary evil can result to those living near or using the stream. The exact degree to which it is necessary to purify sewage in order to secure such a result differs with the circumstances of each case, and the method of sewage purification will in each case depend upon the degree of purity to be obtained and the local conditions about the outlet. In the case of Lockport, Mount Vernon, Middletown and Warsaw, the committee have found sewerage to be essential to the health of the towns, and that they must, therefore, advise it. While on the other hand it has been necessary to consider in the disposal of this sewage the health and interests of people living in other towns and counties on the streams which must receive the water of the sewage.

The wants, the interests and the rights of various communities have thus to be considered, and the plans for sewage disposal adjusted to secure the desired sanitary improvements without producing evil consequences. In the case of the Binghamton asylum the method of sewage disposal used by this State institution was justly causing alarm in the city of Binghamton, and on the recommendation of the Board, appropriation was made by the Legislature, and a plan devised by Mr. Horace Andrews, civil engineer, was approved, and has been executed with most satisfactory results.

WATER SUPPLY.

Since the formation of the Board its advice has been constantly sought as to the purity and wholesomeness of various water supplies used for potable purposes by cities and villages throughout the State. After an experience of some four years with a large variety of cases, it was concluded that the laws of the State were not sufficient to secure the sanitary protection of water supplies. The character of the water supplies of different places varies so much, and the dangers of pollution are so different in different places, that it was impracticable to prepare a general law which could be efficiently applied without being unnecessarily onerous in its restrictions to some localities. A law was, therefore, prepared and recommended to the Legislature by the State Board, and with slight modification passed by the last Legislature. This law imposes upon the State Board of Health the duty of making rules and regulations for the protection of potable water supplies in the State, and gives to such

rules and regulations the force of law when approved by the county judge of the county in which the water supply is situated.

The effect of this law is to enable the State Board to study the special dangers which threaten any particular water supply, and to adapt the protective regulations to the peculiar dangers of the case. Under this law the city of Rochester and the village of Fredonia have during the past summer had rules and regulations made for the protection of their water supplies, and in three other cases informal advice has been given which has substantially secured the same end.

In the case of the city of Rochester, the rules and regulations have been efficiently carried out, although the water supplies come from two different counties, and are used by the city of Rochester, situated in a third county. They have protected the water from pollution, and yet have not proved onerous to the large and varied population living on the water-shed. Not only have the rights of the property-owners been respected, but the rules made primarily for the protection of the people of Rochester have been of marked sanitary advantage by producing greater care and cleanliness in the premises of those living on the water-shed.

The case of Cortland, described in the report of the expert, shows how easily the health of the whole community may be threatened by the willfulness or carelessness of a single individual, as to the matter of polluting a public water supply. Sometimes, as in the case of Nyack, the danger to a water supply arises from too close proximity to cemeteries.

Occasionally where water is stored, the raising and lowering of the lake or reservoir undoubtedly seriously affects the health of the surrounding community. Such a case is illustrated at Rye lake, in Westchester county, where it was permitted by a special act of the Legislature.

The law authorizing the formation of the new aqueduct commission of New York makes it the duty of the State Board of Health to frame sanitary rules and regulations respecting the storage of water in the county of Westchester, and under the later law of 1885, the Board may at any time be called upon to make detailed rules and regulations for the protection of the water supply of the city of New York.

The problem of protecting the health of the people of Westchester county from the ill effects of the storage of great quantities of water for the use of New York city, and also protecting these waters from pollution, is a difficult and complicated one, and has engaged the serious attention of the committee, and of Consulting Engineer Gardiner. As yet no official action has been taken in the matter.

The case of the city of Albany affords another illustration of what has been accomplished by this Board in securing pure water for the citizens of the State. Upon examining the insanitary condition of the Albany basin, it was found, during a careful investigation

made in the autumn of 1884, that the sewage of Albany was reaching its water supply, which was taken from the Hudson river. This led to an examination of the purity of the Hudson below Troy, and to the conclusion on the part of the committee, that the Hudson river above Albany was receiving so much sewage as probably to render it unfit for potable purposes.

As the danger was an increasing one, the Board addressed to the mayor and common council of the city of Albany, in November, 1884, the following resolution:

Resolved, That the mayor and corporation of the city of Albany be advised that, in the judgment of the State Board of Health, it is important that a thorough investigation be made of the dangers of the present water supply, and of the other possible sources from whence a supply could be obtained.

The full report of the Board and its experts was published and widely distributed. The matter provoked much discussion, and at last resulted in the creation of a special water commission, empowered, as the State Board had suggested, to examine all practicable sources of water supply to the city, as well as the sanitary condition of the Hudson river itself. The city board of health also made an investigation of the condition of the river. Prof. Mason, of Troy, after a very thorough chemical analysis of samples of the river water, taken between Lansingburgh and Albany, condemned it as having already become polluted with sewage beyond the limits recognized among chemists as safe. The chemist of the special commission, Prof. Leeds, arrived at the same conclusion, and the commission condemned the river water as now furnished to the city, as unfit for potable purposes, and recommended the supply from another source. Their recommendations were adopted by the common council, and under the law, the commission are empowered to proceed to furnish the city of Albany with a supply of pure water.

Such satisfactory results encouraged the committee in making every effort to follow out the work of securing pure and wholesome water for the citizens of the State, by investigating water supplies, detecting sources of pollution and setting clearly before the people the facts ascertained, and the direction in which remedies should be sought.

ERASTUS BROOKS,
Chairman.

DRAINAGE OF ABANDONED CANAL, ROME.

To the Committee on Drainage, Sewerage and Topography:

GENTLEMEN — Chapter 312 of the Laws of 1885 directs the drainage of the channel of the abandoned canal in the city of Rome and makes appropriation therefor, the work to be done by the Superintendent of Public Works, under the advice and direction of the State Board of Health. In pursuance of this act the matter was referred to me with power, and Mr. O. S. Wilson was sent to make surveys of the ground and report a plan for the drainage of the canal. His report is herewith transmitted with my approval of its recommendations, but with certain modifications as to the size and character of the channel which it is proposed to construct. The exact character of the drainage channel which I approve is hereinafter described.

Mr. Wilson's plan was made when the water was very high. The water is now low; and after examining into its present condition, Mr. Wilson is agreed with me as to the modifications of his plan.

Before discussing the details of this drainage plan, Mr. Wilson calls attention to the necessity for a system of sewerage in Rome, and to the present unwholesome methods of sewage disposal which are practiced there. In view of the great importance of this matter, I made a sanitary reconnaisance of the city and had a meeting with the mayor of the city and the board of health.

The streets of Rome are now so well graded and the gutters so well paved that there is no difficulty as regards the surface drainage of the city. Where the surface grades have proved too flat to carry off storm water, cheap and short storm-water sewers have been laid only three or four feet below the surface. These gutters and short storm-water sewers find outlet into Wood's creek; the existing canals and the bed of the old abandoned canal are on the southern side of the city. There are severe ordinances against turning any house drainage of any kind into these storm-water ways, and the ordinances are so rigidly enforced that I find no case of their violation. Where the storm-water drains of the city enter the bed of the abandoned canal there is absolutely no evidence of any pollution from this cause.

The great difficulty in Rome arises from want of some proper means of sewage disposal. The greater part of the city put the filthy wastes of their dwellings into the soil, which is of a very porous coarse gravel, down to the level of the ground water, which averages, perhaps, twenty feet below the surface in the higher part of the city.

The soil is so porous that the leechings from the privies and cess-pools pass rapidly away to the ground water. The city has an ample water supply; and where people have abandoned the use of their wells, they have, in a great many cases, made cess-pools of the wells, so that an enormous amount of filth is reaching the ground water directly.

The pollution of the ground water and of the soil of course pol-

lutes the wells which are still in use, and in this way very seriously endangers the public health. It also endangers the health of all people by poisoning the ground air which rises through the cellars into the houses. This is especially while the ground is frozen, so that fevers and other diseases, resulting from filth poisoning, will be very likely to occur in the latter part of winter or early spring after the people have been breathing polluted air for several months.

The soil of Rome must contain from 30 to 40 per cent of its bulk of air. This air, being in contact with polluted soil and the grossly polluted water, must of itself become contaminated, and will eventually produce serious consequence to the public health of the city. A small number of people have built private sewers which empty into the canal. The sewage from the hotels finds its outlet in this way. As near as we could ascertain there are some twenty private drains carrying sewage which enter the Black river and Erie canal at Rome. The Superintendent of Public Works has ordered all sewers emptying into the canal to be cut off after reasonable notice to the owners. The question of a system of sewerage must, therefore, be immediately considered by the citizens of Rome.

With this view I made a very general reconnaissance of the city, and my impression is that it could be sewered by the separate system which will provide for the carrying away of all the sewage and for the drainage of cellars at a cost not to exceed $100,000; and that the outfall for this system may either be into Wood creek or into Mohawk river, or into both, and that to prevent the creation of nuisance it would be necessary to purify the sewage before the affluent is allowed to pass into either of these streams.

DRAINAGE OF ABANDONED CANAL.

The channel of the abandoned canal which skirts the southern side of the city of Rome is about 11,000 feet long. The fall is so slight and the channel so large that in time of low water the flow is almost expended. This abandoned channel is used as the outfall for five large ditches which drain the land that lies to the south of the city. It is of great importance that it should be kept open as an outfall for these drains.

The surface water from a number of square miles reaches the old channel so that in time of heavy rains a large amount of water finds its way to the abandoned canal; but the channel of this canal is in its present condition a nuisance owing to the fact that very large accumulations of organic matter have taken place in it, owing principally to the rapid growth and decay of vegetation in the channel. It has in time of low water carried into it by surface waters vegetation from the surface of the drainage area.

The old bottom which is now from twelve to twenty feet broad is covered with this decomposing organic matter or with a thick growth of aquatic plants which find nourishment from it, and so impede the current as to produce stagnation of the water. In only three places was I able to detect house or manufacturing wastes en-

tering into the channel. One of these drains was from the knitting mill and there was no question that it brought down human excrement. The other is an old box drain opening close to the knitting mill drain, the water from which had an offensive odor. It is said that this drain was long ago cut off from house connections and that the offensive odor from the water is due to the fact that the drain was not properly cleaned when it was cut off. The third drain is from the oil tanks and brings down apparently merely oil which creates an offensive odor. The amount of organic matter brought down by these is so very small that the condition of the channel of the old canal below them is hardly any worse than it is above. They ought, however, to be cut off, and nothing but storm water should be allowed to enter the old canal.

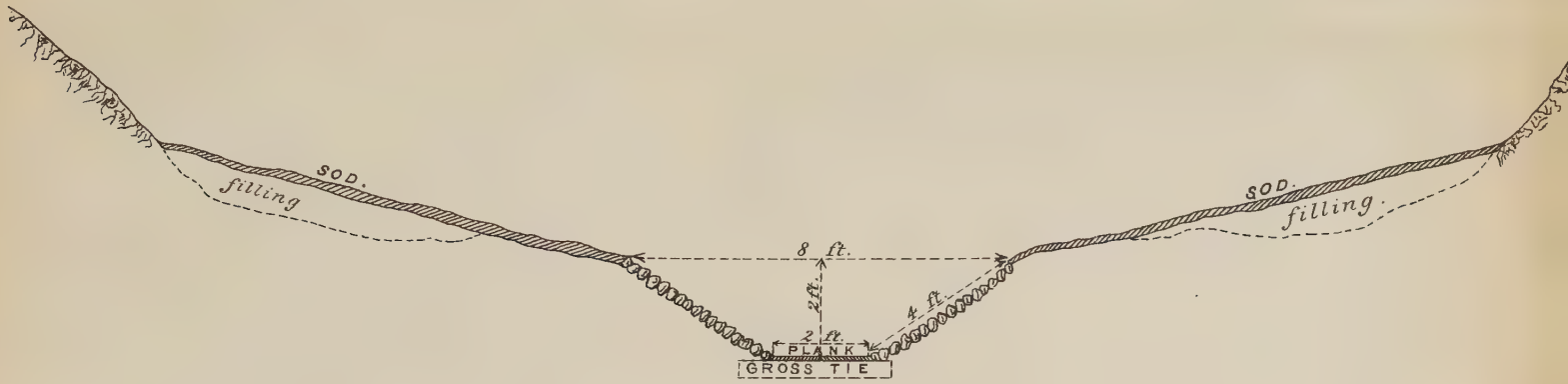
It appears, therefore, that the condition of the channel is a nuisance due not to the sewage from Rome being turned into it, but from accumulations of organic matter and silt. The water from the old canal finds outlet into Wood's creek just above Dockstatter street. The flow of this creek is sufficient to prevent any accumulations of water in the old canal, if the channel of the canal was put into condition to deliver its water into the creek. It is, however, possible to increase the flow of this creek by a small expenditure of money.

PLAN FOR DRAINAGE.

I examined every part of the old canal from the dive culvert at Whitehall creek to the entrance into Wood creek, and also the channel at Wood creek to the culvert under the Erie canal, a total distance of nearly five miles. From Whitehall creek down to Lawrence street the fall of the old canal is so slight and the channel so broad and so filled with vegetation and the amount of water entering the canal is so small that no flow is perceptible. It is not until after passing the entrance to a large drainage ditch below Lawrence street that a marked flow is observed. From James street down the fall increases, due to the channel having been cleaned some years ago, and here a very marked flow begins. From James street down to Jay the flow at present, except where it is dumped into pools, is sufficient to prevent any stagnation. The fall here is about nine inches to the thousand feet. Above Lawrence street there are no houses in the neighborhood of the old canal, nor are there likely to be.

The old canal passed out of the settled portion of Rome at Jay street. It is of the utmost importance to the health of the people that the channel should be in perfect sanitary condition between Lawrence and Jay streets, a distance of 5,725 feet. Below Jay street a perfect cleanliness of the channel is of less importance; but its grade is full of importance as facilitating the outfall of the upper part of the channel.

From Mr. Wilson's profile it appears that the best grade can be secured by cutting down the channel of the old canal in the upper part of Wood's creek, making an even grade from Lawrence street



Adopted Section

SCALE 1 in. = 4 ft.

and Dockstatter avenue, near the Hammel farm. This is a distance of 8,865 feet. The fall will be about six and one-half inches to the thousand feet. The grade secured will be almost as good as if an even grade should be made from Lawrence street to the canal culvert, a distance of 21,000 feet. The fall from Lawrence street to the canal culvert is some thirteen feet. And if the old canal and Wood creek were graded to an even grade the fall would be about seven inches to the thousand feet. It, therefore, appears that in the matter of grade there would practically be no difference between a plan contemplating a rectification of Wood creek and one that would simply secure the grading of the old canal channel. I, therefore, recommend that the channel of the old canal between Lawrence street and the dry-dock culvert and the ditch and channel of Wood creek from the dry-dock culvert to Dockstatter avenue, be graded to a slope of six and one-half inches to the thousand feet. As regards the size of this channel it is important to its low-water flow that it should be as small as possible.

From an examination of the banks of the stream I find that the floods in the old canal move so slowly that there is no perceptible washing of the banks down to within six inches of the low-water surface. A heavy sod grows on these banks, which is not disturbed by the floods that sometimes cover them.

In view of this fact and of the very small amount of water flowing in the channel in summer, when it is most important that it should not stagnate, I recommend that the cross section of the channel be made only two feet on the bottom and two feet deep, with slopes of one and one-half to one. This will give a channel of two feet wide on the bottom and eight feet on the top, with a depth of two feet.

I recommend that the bottom of this channel be made of two-inch plank in order to secure smoothness and the most rapid flow on the light grade. The smoothness of the bottom will also facilitate cleaning.

The slopes of the channel should, as Mr. Wilson recommends, be made of cobble stones. These slopes will measure four feet on their surface. The channel here described will provide for the flow of the stream at all times, except unusual floods. To prevent the washing from floods, the bank above the cobble stones should be sodded. There are plenty of sods growing now upon the banks to accomplish this at a very small cost. I consider sodding better than sowing the banks with grass, because the sods already on the borders of the old channel have a very large mass of roots, which will very effectually prevent any washing in time of floods. The general level of the ground being some five or six feet above the old channel, the waterway included between the sodded banks will be ample to carry off freshets, and the movement will be so slow that it is not probable that any wash will take place. A diagram of the channel described is here given.

Above Lawrence street, I agree with Mr. Wilson that the only

method of treatment will be to partially fill the old channel, leaving a narrow ditch for drainage purposes. This filling need not be deep to secure a great improvement in its sanitary condition. A filling of a foot and a half in the center of the channel, and of three feet on the sides would remedy the greater part of the evil which now exists in this raw, swampy and stagnant channel.

A small sum should be expended in cleaning out the channel of Wood creek, and in cutting away a few shallow bars which impeded the flow of the stream. With these slight modifications in the channel there will be ample outfall for the water from the old canal.

The first and most important part of the work is the grading from Dockstatter avenue to Lawrence street, and the constructing and paving of the channel from Jay to Lawrence streets. The appropriation is undoubtedly sufficient to accomplish this, and leave something over toward filling the canal above Lawrence street, and the carrying out of the measures suggested for the improvement of the flow of Wood creek.

Very respectfully yours,
JAMES T. GARDINER,
Consulting Engineer.

REPORT OF MR. WILSON.

JAMES T. GARDINER, Esq., *Consulting Engineer:*

SIR — The city of Rome, N. Y., contains about 12,000 inhabitants, and is situated upon a low divide between the waters of the Hudson and those of the St. Lawrence river.

The Mohawk river flows through the east and Wood creek through the west side of the city. The divide between these is less than twenty feet high in most of the city and is not easily located. It is I believe the only city in America that can sewer naturally into two great river systems.

The Black River canal joins the Erie at Rome. At an early day a canal with locks joined the Mohawk river and Wood creek, evidences of which still exist.

Before the enlargement of the Erie the main canal ran near the southern limit of the present city but was abandoned about forty years ago. The land south of the city lying between Whitehall's and Mud creeks is very flat and swampy. Much of this land has been reclaimed. About thirty years ago legal steps were taken to drain this area, and ditches were dug draining into the abandoned canal, some of which are indicated in the accompanying map. The soil upon which the city is built is loam or sand from one to three feet deep, underlying which is about eight feet of very coarse gravel; then a stratum of clay varying from a few inches to two feet in thickness, and beneath this is a stratum of finer water-washed gravel.

CITY WATER SUPPLY.

About twelve years ago a system of water-works was put in, taking the water from the Mohawk, about two miles north of the city. At present about one-half of the population relies upon common dug or driven wells that range from twenty to thirty-five feet in depth. Some uneasiness exists respecting the purity of the Mohawk river water furnished, owing largely to the amount of earth in suspension. Although I made no special examination I venture the opinion that the hydrant water is vastly superior to any well water in the city for reasons that will be given below.

DRAINS AND SEWERS.

The city has put in more than a mile of sewer pipe-drains to carry off the surface rain and snow water from the streets. One of these sewers empties into the old canal under the James street bridge. As might be expected some of the residents are desirous of putting their house sewage into these drains; but the local board of health are determined to keep such sewage out and deserve much credit for their watchfulness and care in this matter. Some of the hotels and business places and a few residences have sewers leading to the Erie and Black River canals which empty sewage. There are about twenty such sewers, most of them emptying below the water-line when the canals are full. Rome is on the long level, nearly sixty miles in length, of the Erie canal, and the summer flow of the Mohawk river and Wood creek is taken into the canal. These together with the water locked down the Black River canal forms the principal feeder for this long summit level. As a result there is a current in the canal both ways from Rome and the sewage emptied in is carried away from the city. While this method of sewage disposal is a benefit to Rome it is contrary to law and should be discontinued. Some residences supplied with river water that are too far from the canals to sewer into them economically have cess-pools into which house sewage is run. Some of these cess-pools are old abandoned wells dug into the water-bearing strata, from which, as stated above, about half the citizens derive their water supply. It is evident that this method of sewage disposal is the very worst that could be devised and it will, sooner or later, be fruitful in producing and spreading disease.

The city has no system of sewers, and the distance to which it seems necessary to go for an outlet has acted as an insurmountable barrier when the subject has been broached. It will be necessary to go about two miles east to reach a sufficient summer flow in the Mohawk to empty sewage into; or about the same distance west to reach a similar state of water in Wood creek. The city of Rome is well adapted to enjoy the advantages of the separate system of sewers and it can better afford to put such a system in now, than run the risks they now do, which would be much enhanced should the sewers now emptying into the canals be cut off by the State authorities, as

they doubtless should and probably will be. The city is now enjoying a low death-rate.

After the preceding remarks of a general character, I now approach the main subject of this report.

THE ABANDONED CANAL.

This extends from the road near the dive culvert, through which Whitehall's creek passes under the Erie canal, on its way to the Mohawk, about two and one-tenth miles north-westward, to near the dry dock.

Along the line of this old canal several ditches enter from both sides, which with the overflow of Whitehall's creek in the spring, makes quite a stream, but in summer forms an elongated cess-pool with little water, and that stagnant. The bottom is filled with aquatic vegetation which hinders what little flow of water there is from rains. At the crossing of Lawrence street, which crosses at an angle with the canal, there is a stone arch culvert which makes an angle with both the street and the canal, that throws the water, leaving it against the cemetery bank, with the effect of washing said bank away, and washing a hole out in the canal bed. Efforts have been made to protect this bank, but so far have failed. At James street a sewer empties; on the east side of the N. Y. C. R. R. crossing a drain from the knitting mill empties. I did not ascertain if any deleterious material is emptied there. About a hundred feet west of said railroad crossing a drain enters from the north which empties more or less oil refuse, which not only renders the air offensive, but pollutes the water perceptibly for a mile below. This drain is a nuisance and should be abated. At the west end of this stretch of abandoned canal the water enters Wood creek, which has been straightened at this point for about 600 feet. At this point also is a culvert under the R., W. & O. R. R., through which the water from the dry dock, when it is emptied, enters the old canal. The difference of level in the canal is so slight (see profile) that in summer the emptying of the dry dock suddenly, of so large a volume of water, causes a back water flow as far as Jay street, before the creek below gradually carries it off. A deep hole has been washed out below said railroad culvert. The only place where the water from the old canal can get through under the Erie canal is about two miles—two and six-tenths miles by the windings of the creek—west of this railroad culvert, where a culvert was constructed for Wood creek. About half way down this creek Mud creek enters it from the south, and is about the size of Wood creek above the junction. These creeks run through low land, are from six to fifteen feet wide and about four feet deep. There are several places where fallen trees and stumps have formed partial dams.

At the time of my survey the streams were unusually high, owing to frequent heavy rains, and while the profile given is fairly accurate, I will re-run the levels during low water and give a more exact profile and grade before work is begun, frequent benches having been left for this purpose.

NEW YORK STATE BOARD OF HEALTH

Sketch to accompany

SANITARY REPORT ON THE DRAINAGE OF THE

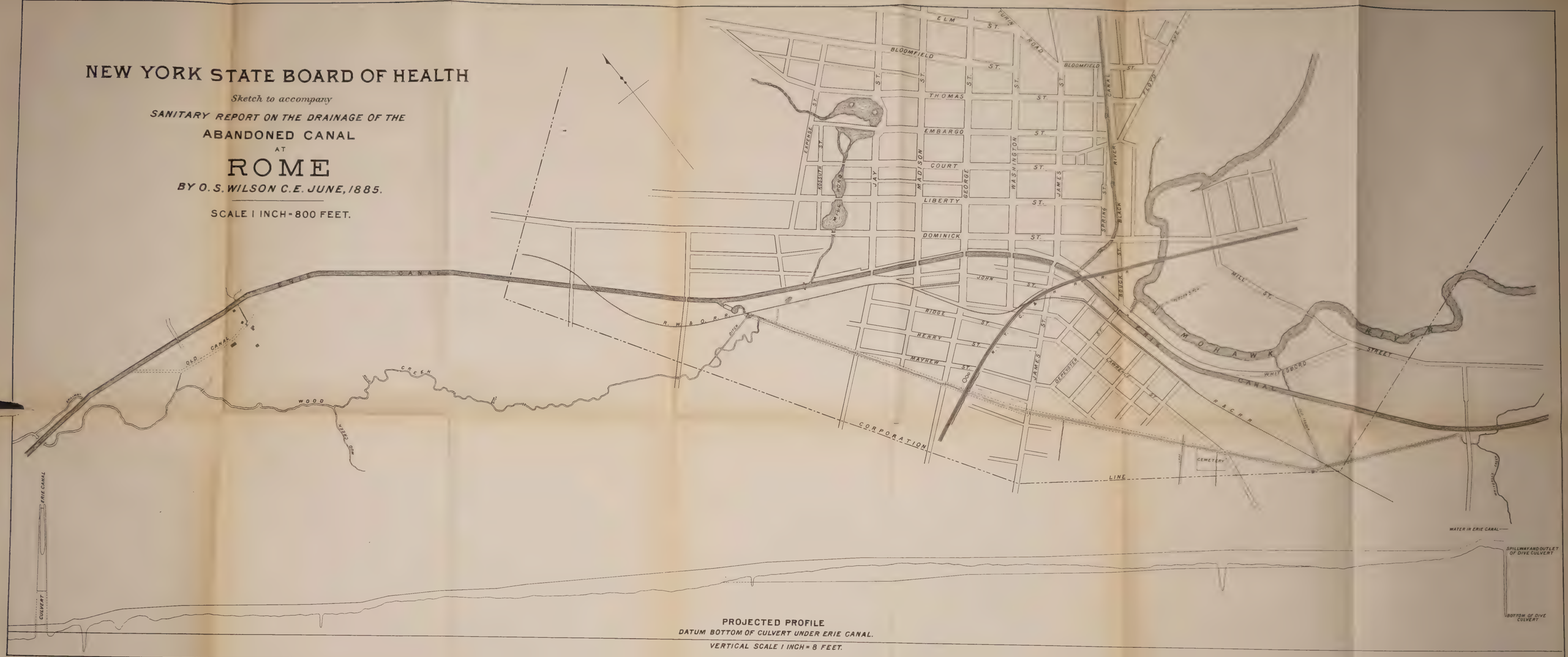
ABANDONED CANAL

AT

ROME

BY O. S. WILSON C.E. JUNE, 1885.

SCALE 1 INCH = 800 FEET.



PROJECTED PROFILE

DATUM BOTTOM OF CULVERT UNDER ERIE CANAL.

VERTICAL SCALE 1 INCH = 8 FEET.

Proposed Plan.

As it will be necessary to provide a free outlet for the drainage of the canal, I would propose the removal of the trees and other obstructions in the creek channel, and would advise that an extreme limit of $500 be the amount to be expended in the removal of obstructions and bars. Much less than that amount *may* suffice.

Through the old canal bed I propose to narrow the water channel for the summer flow of water. To dig a ditch about four feet wide on the bottom with sloping sides of one and a half or two to one; to be paved (see sketch appended) with stone in ground too soft to remain in place unsupported. I think hard clay or gravel will be found most of the way that will not require paving.

The length of the old abandoned canal is about 11,000 feet. The ditch should be dug through the entire length, the material thrown up on the bank, the whole bottom afterward covered with clean earth from the banks. Cobble stones can be obtained for eighty cents per cubic yard, delivered, which will pave about fifty square feet of surface, as the stones should be somewhat larger than ordinarily used in street paving. The paving of the sides of the ditch to be stopped at a height of about three feet from the bottom. There would be about sixteen square feet of paving per foot of length of ditch, and about one cubic yard of excavation.

I consider the following a liberal estimate per foot of length of the ditch:

16 square feet paving, at 4 cents	$0 64
1 cubic yard excavation, at 15 cents	15
	$0 79

I would suggest that, so far as practicable, the proposed ditch be completed and paved at the west end and as far east as possible, so that what is done may be of permanent value. The State may never need this land for canal purposes again, and were it not necessary to provide a ditch for draining the low land on the divide, it might be the cheapest in the end to fill the canal as it was originally; still if it can be made unobjectionable from a sanitary standpoint and still answer as a main drainage ditch, it will be of great benefit to the adjacent owners and indirectly to the State at large; at the same time it would be to the advantage of all living near it to see that it is not made a dumping ground for dead animals and other objectionable refuse, simply because it is State land and not continually under close supervision.

I would suggest that the bank of the creek opposite the culvert at the dry dock be protected so it will not wash. I am not certain that it is the province of the State to do this, however.

A heavy wing wall of stone at the lower end of the culvert, under the Lawrence street crossing, should be so constructed as to turn the current in a direction parallel to the center of the canal. It would,

in my judgment, prevent the washing of the cemetery bank, and would cost about $50. It may also be necessary to do some cleaning out of a channel of Whitehall's creek, but nothing of an expensive nature will be necessary.

Respectfully submitted,

June 12, 1885 O. S. WILSON, *C. E.*

ESTIMATES FOR ROME.

Excavating *Wood creek* below dry dock		$300 00
Widening and deepening 700-foot ditch, at 20 cts	$140 00	
Cleaning and deepening 1,600-foot creek, at 10 cts	160 00	
Dry dock culvert to Jay street — Deepening and grading channel, 1,750 feet, at 20 cts		350 00
Jay street to Lawrence street, 5,800 feet, at 78 cts		4,524 00
Providing material excavated will do for lining, the estimated price per foot is 70 cents, or, $4,060 made up as follows:		
8 square feet paving, at 4 cents	32 cents.	
5 feet hemlock, at $13 per M	7 cents.	
Laying same and spikes	3 cents.	
Excavation and filling one cubic yard, at 25 cts.	25 cents.	
Sodding banks	3 cents.	
	70 cents.	
Lining, one cent extra per square foot	8 cents.	
Building wing wall at Lawrence street		50 00
Filling and *grading* 3,500 feet *above Lawrence street*, 7,000 cubic yards, at 25 cents		1,750 00
Contingencies, engineering and *supervision*		1,026 00
Total		$8,000 00

O. S. WILSON.

THE ELMIRA REFORMATORY SEWER.

The committee herewith reports to the Board for its approval the plan for the Elmira Reformatory sewer, submitted by Consulting Engineer James T. Gardiner, and recommends its adoption.

ERASTUS BROOKS, *Chairman*,
GEORGE W. COOKE,
EDWARD M. MOORE, *President*,
ALFRED L. CARROLL, *Secretary*,
Committee.

Consulting Engineer's Report.

To the Committee on Drainage, Sewerage and Topography:

GENTLEMEN — Nearly a year ago I visited Elmira to examine the condition of the abandoned Chemung canal in that city, and I found that the prism for nearly half a mile was a prolonged cess-pool, and that one of the most prominent sources of pollution of the water in the abandoned canal was from the Elmira Reformatory sewer which is laid in the prism of the canal, but for a long distance is on the side slope of the canal, and raised above the surface of the water in the canal. This sewer is made of cemented pipe with open joints, and for much of its length was uncovered. The action of the weather had broken and enlarged the joints in many places. The sewage was freely running out into the canal.

The abandoned canal appears now to have become private property. As chairman of the committee of drainage, sewerage and topography I recommended in February last that the State Reformatory should proceed as soon as possible to construct a tight sewer covered with no less than three feet of earth, the same being built upon public property, where it would always be accessible for repair.

At my request the city engineer made a preliminary survey to determine whether a new sewer could be built following the line of a public street. The survey showed that it was practicable, and an appropriation for this purpose having been made by chapter 346 of the Laws of 1885, Mr. O. S. Wilson, by the direction of the Superintendent of Public Works, has made a final survey of this route, which proves it to be entirely possible and the only practicable route by which the Reformatory sewer can find outlet into the city system without traversing private property.

I, therefore, recommend that the present Reformatory sewer be cut and intercepted on Reformatory street between the Erie railroad track and the abandoned canal by a sewer fifteen inches in diameter where straight, and eighteen on curves, and passing along Park avenue, to Baldwin street, to Division, to Maxwell avenue, to East Washington avenue, and there enter the State system of sewers. The distance will be about 5,400 feet and a grade of one in a thousand is practicable. From East Washington avenue up to Division street the pipe should be eighteen inches in diameter, as the city will doubtless use it as part of their system.

Just below each street crossed and at each end of curves a manhole should be put in, also one at each connection with existing sewers. One should also be placed on the east side of the New York, Lake Erie and Western railroad crossing. As there will be but a few feet of earth on the pipe under the railroad track, it would be wise to make the sewer at this point of cast-iron pipe, fifteen inches in diameter.

In accordance with the law no work should be done until the proper authorities of the city of Elmira shall have given permission to lay the sewer in the streets of the city and to connect with the city

sewers, and in consideration of the State granting to the city the right to use this sewer for city purposes, nothing should be done until the city agree to care for and maintain the Reformatory sewer within the corporate limits of the city.

Very respectfully yours,

JAMES T. GARDINER,
Consulting Engineer.

SPECIFICATIONS FOR THE ELMIRA REFORMATORY SEWER.

The line of the sewer to be constructed is as follows: Beginning at a point in the Elmira city sewer in East Washington street, near Maxwell avenue; thence by a curve into Maxwell avenue; thence along said avenue to a point near Division street; thence by a curve into said street; thence along Division street to a point near Baldwin street; thence by a curve into said street; thence along Baldwin street to a point near Park avenue; thence by a curve into Park avenue; thence along said avenue to a point near Reformatory street; thence by a curve into said street; thence along said street to a point to be selected by the engineer, where a junction will be made with the Reformatory sewer, now laid in said street.

The length of said curve will be about 5,300 feet, of which about 2,500 feet will be of eighteen-inch pipe, and about 2,800 feet will be of fifteen-inch pipe; about 100 feet (more or less) of said fifteen-inch pipe will be cast iron, weighing about 120 pounds per foot of length.

The sewer pipe to be used shall be of first quality, salt glazed, vitrified, earthenware pipe, without cracks or blisters.

About 120 six-inch Y branch connections will be used, about 70 of which will be in eighteen-inch pipe, and about 50 in fifteen-inch pipe (none in the iron pipe); these shall be put in at points to be designated by the engineer.

The connections should be put in as often as necessary for city use.

The range in depth of excavation is from 3.1 feet to 11.7 feet, with an average depth of 7.75 feet.

The soil, so far as is known, is gravel and clay.

There will be needed about twenty man-holes. The engineer reserves the right to make the number one or two more or less.

The sewer will be staked out by the engineer, and will follow, as far as practicable, the center line of the street.

The contractor will be required to preserve all stakes and bench-marks until permission is given by the engineer to remove them.

EXCAVATION.

All excavation should be by open cut from the surface.

Should the contractor think it best to keep the sides of the excavation vertical, by bracing or otherwise, it is expressly understood that it shall be done at his own cost.

The sides of the excavation, whenever it shall be necessary in the opinion of the engineer, shall be supported by suitable plank and

shoring, but no allowance will be made therefor, unless the same is left in the trench by written order of the engineer.

The trench shall be dug to within six inches of grade, by measurement from the witness stakes on the surface. The last six inches shall be taken out after the grade pegs have been set in the bottom of the trench by the engineer. Grade pegs will be set by the engineer every twelve and one-half feet on the center line at the bottom of the trench.

In no case, without previous written permission from the engineer, shall more than 200 feet of trench be opened in advance of the completed sewer.

The material excavated shall be laid compactly on the sides of the trench, and kept trimmed up so as to be of as little inconvenience as possible to the traveling public and adjoining tenants.

The contractor shall not obstruct the gutter of any street, but shall use all proper measures to provide for the free passage of surface water along the gutters.

The contractor shall provide for all water-courses and drains interrupted during the progress of the work, and replace them in as good condition as he found them.

The earth shall be removed under the sockets of the pipe so as to allow the pipe to rest evenly along its whole length.

The excavation at the joints shall be at least six inches outside of the joints to be perfectly cemented.

The contractor will be required to observe all the ordinances of the common council in relation to obstructing the street, keeping open passage-ways and protecting the same when they are exposed and would be dangerous to the public travel.

Upon the suspension of any work the trench is to be refilled and repaved or re-macadamized as the case may be, unless the engineer shall otherwise direct; and all materials, surplus earth, sand, rock and rubbish removed from the street within three days thereafter, or they will be removed at the contractor's expense.

In the progress of the work the contractor will be required to preserve from obstruction all railroad tracks which may be affected by the prosecution of the work herein described; and also afford the necessary facilities to the company or companies owning such tracks; or to their agents, in their preservation of the same from injury, without extra charge therefor.

Under the railroad tracks and over the culvert on the abandoned Chemung canal at the discretion of the engineer, sixteen-inch cast-iron pipe shall be laid with tight joints. The pipe to be pressure pipe of about five-eighths of an inch in thickness and weighing about 120 pounds per running foot.

Protection of Water and Gas Pipe.

The contractor shall do whatever may be necessary to keep in position and protect from injury all water and gas pipes, lamp-posts,

service pipes, and all other fixtures which may be met with in carrying on the work.

In case any of the said gas or water pipes or other fixtures be damaged, they shall be repaired by the parties having control of the same, and the expense of such repairs shall be deducted from the amounts which may become due the contractor.

So far as is now known no gas pipes will be encountered and but one six-inch water pipe will be crossed, and that is supposed to be above the grade of the sewer.

PROTECTION AGAINST ACCIDENTS.

The contractor shall erect suitable barriers around all excavations to prevent accidents to passengers on the streets, and shall place and maintain during the night sufficient red lights on or near the work.

The contractor shall have charge of and be responsible for the entire line of sewers for whose construction he has contracted, until their completion and acceptance.

BACK FILLING.

The earth filled around and on top of the pipes shall be free from stone and tamped with the utmost care, so as to obtain the greatest compactness and solidity possible. In filling, the earth shall be kept at the same height on both sides of the pipe. The earth shall be rammed in layers of not more than one foot thick up to the surface of the street, and in no case shall the number of men filling be more than twice the number of men ramming.

The trench must in all cases be filled to the proper grade with suitable material, free from stones over four inches in diameter. Should there be a deficiency of proper material for refilling the trench, the contractor will be required to furnish the same at his own cost.

REPAVING AND RESTORING STREETS.

Where the pavement has been removed, it must be replaced by the contractor and left in as good condition as it was before being removed.

All surplus material and rubbish must be removed by the contractor.

All work of restoring the surface of the streets shall be done to the satisfaction of the engineer.

PROTECTION OF PROPERTY.

The contractor shall, at his own expense, shore up, protect and make good, as may be necessary, all buildings, walls or fences injured or liable to be injured during the progress of the work; and the contractor will be held responsible for all damage which may happen to neighboring property from neglect of this precaution or from any other cause connected with the prosecution of the work.

PIPES — HOW LAID.

Especial care must be taken to lay the pipe to the exact grade and line.

All pipes previous to being lowered into the trench shall be fitted together and matched, so that when jointed in the trench they may form a true and smooth line of pipes.

It is desirable that the pipe and the wire connections be from the same maker as otherwise the chipping and fitting necessary to form a joint is not only troublesome but objectionable.

All pipes shall be laid with a straight edge, beveled to grade, furnished by the engineer. One end of the straight edge shall be placed on the nearest grade peg and the other on the flow-line of the pipe to be laid, and the height of the pipe shall be so adjusted that a builder's level placed on the upper edge of the straight-edge shall be perfectly level. The level used for this purpose must be kept in perfect adjustment by the contractor.

JOINTS.

A gasket of oakum or other material approved by the engineer shall be pressed into the joint around the entire circumference of the pipe to prevent the entrance of cement to the inside of the pipe. No joint shall be cemented until the gasket of the next joint in advance has been completed.

The cement shall be pressed into the space between the socket and spigot so as to entirely fill the space, and the bevel joint at the end of the socket shall be smoothly and evenly made.

Special care must be taken to make perfect joints at the bottom of the pipe.

The excavation made for the socket of the pipe shall be filled with sand to support the cement firmly in position.

When the joint is completed, great care must be taken not to disturb the pipes.

CEMENT.

The cement for filling the joints shall be pure, fresh-ground Rosendale cement of best quality, with only enough water added to give it the proper consistency and shall be used as soon as mixed.

BRANCHES.

The "Y" branches and man-holes shall be placed at points indicated by the engineer. Their location will be indicated by stakes driven at the sides of the trench.

The "Y" branches shall be elevated to correspond to the lateral sewers and house-drains entering them. They shall be closed with an earthenware cap, and the space above the cap shall be filled with sand covered with a thin coating of cement.

SEWERS TO BE KEPT CLEAN AND FREE FROM WATER.

All the pipes must be kept thoroughly clean, and no water will be allowed to flow through them in any case whatever, during the construction of the sewers, unless properly settled.

When the trench is left for the night, or the pipe-laying is stopped by rain storms or any other cause, the ends of the pipes must be closed water tight with a plug and cement, or with bricks and cement, as the engineer may direct.

When running quicksand or other treacherous ground is encountered, the work shall be carried on day and night, should the engineer so require.

ARTIFICIAL FOUNDATION.

Whenever ordered by the engineer, in writing, the contractor shall excavate to such depth below grade as the engineer may direct, and the excavation shall be brought to grade with such material as shall be ordered by the engineer; the extra work to be paid for upon the estimate of the engineer.

If the contractor excavate below grade without orders, he will be required, at his own expense, to fill the excess of excavation with such material as the engineer may direct.

Concrete formations shall be placed under the man-holes when so directed by the engineer.

CEMENT MORTAR.

The cement mortar for man-holes, lamp-holes and concrete shall be made of best quality of fresh ground Rosendale cement and clean, sharp sand, in the proportion of one measure of cement to two of sand. The sand and cement shall be thoroughly mixed dry, and such quantity of water added so as to form a paste of the proper consistency. All mortar to be fresh for the work in hand. No mortar that has begun to set will be allowed to be used.

CONCRETE.

The concrete used on the work shall be made of stone, broken so as to pass through a two-inch ring, and cement mortar. The stone shall be free from dirt. The cement, sand and stone shall be mixed in the proportion of one of cement, two of sand and two of stone.

MAN-HOLES.

The man-holes shall be constructed of hard brick laid in cement mortar. The thickness of the wall shall be ten inches.

The man-holes shall be elliptical in cross section at the bottom four feet long and three feet wide inside measurement at the top of sewer pipe, to be afterward drawn into a circle of two feet radius at the top, which shall be ten inches below the surface of the street. The brick work to be surmounted with a cast-iron top and cover, such as are now used in the city of Elmira.

The man-holes shall rest on a plank foundation of two inches thickness, the top of said foundation to be eight inches below the bottom of the sewer. Sound hemlock plank to be used for said foundation. An eight-inch arch of brick shall be turned over all pipes entering a man-hole. The man-hole shall be constructed as

the sewer is laid, except the filling in of the inside bottom of the sewer through the man-hole. This shall be put in all man-holes before the connection is made with the existing sewer on Reformatory street, as they may be needed as settling basins, or for the better pumping of water from the sewer during construction. The engineer reserves the right of altering the shape of the man-holes at the bottom. The bottom of the man-holes shall be laid in brick and cement mortar to the height of the top of the sewer pipe, the channel through said bottom being made to conform to the size of the pipes. At the discretion of the engineer, iron steps shall be put in the wall of the man-holes. Said steps to be made of three-fourths round iron, with two angles. Said step when in to project three inches into the man-hole, and to be twelve inches long. Said steps to be sixteen inches apart vertically. Said man-hole top, covers and steps can be obtained in Elmira for $10, or less, per man-hole. The top of said man-hole covers to be set at the present grade of the streets.

Materials to be Used in the Construction of Brick Masonry.

In the construction of the brick masonry, none but the best quality of whole bricks, burnt hard entirely through, shall be used, which are to be thoroughly wet immediately before being laid. Every brick is required to have full cement joints under bottom, sides and ends, which, for each brick, is to be formed at one operation, and in no case is it to be made by working in the cement after the brick is laid. The bricks to be culled as they are brought upon the ground, and all bricks of an improper quality immediately removed from the same.

Materials — How Furnished.

All pipes and other materials shall be furnished by the contractor.

Materials to be Inspected by Engineer.

No materials of any kind shall be used in the construction of the sewers until they have been examined and approved by the engineer.

Vary Work.

The work shall be carried on in such portions as the engineer shall direct, and he shall have power also to vary, extend or diminish the quantity of work, during its progress, without vitiating the contract; but no parts of the works shall be altered by the contractor from that shown on the drawings, or described in the specifications, without the express sanction of the engineer in writing. The engineer shall also fix the price to be paid for all work that may be necessary to be done that is not included in the contract.

Freezing Weather.

No pipes or masonry will be allowed to be laid in freezing weather.

DISORDERLY OR INCOMPETENT WORKMEN.

If any person employed by the contractor on the work shall appear to the engineer to be incompetent or disorderly, he shall, on the requisition of the engineer, be immediately discharged, and such person shall not be again employed upon the work without the permission of the engineer.

OMISSION IN SPECIFICATION.

Should any work be accidentally omitted therein, which may be fairly implied as included in the contract, of which the engineer shall judge, the same shall be executed at the expense of the contractor.

LENGTH OF SEWER.

The length of the sewer will be measured on the center line of the pipe.

Should any delay occur during the construction on said sewer, owing to the non-delivery of sewer pipe or other material, the contractor shall pay the engineer during such delay his regular pay and expenses, such pay to be deducted from moneys due the contractor at the completion of the work.

INTERPRETATION OF TERMS.

Wherever the word "engineer" is used, it shall be held to mean the engineer in charge of the sewers, or his authorized assistant.

Wherever the word "contractor" is used, it shall be held to mean either any contractor or firm of contractors, or any member of a firm contracting for work herein specified.

Bids shall state the price per lineal foot of pipes of each size laid as herein specified, which price shall be in full for all labor and materials required for the complete execution of the work; also the price for each man-hole complete.

O. S. WILSON, *C. E.*

At a meeting of the State Board of Health, on the 24th of September, the above report was presented, and on motion was adopted by the Board, its recommendation approved, and a copy ordered transmitted to the Superintendent of Public Works.

ALFRED L. CARROLL, M. D.,
Secretary.

The following documents show the appearance for an unforeseen nuisance, and method of remedy:

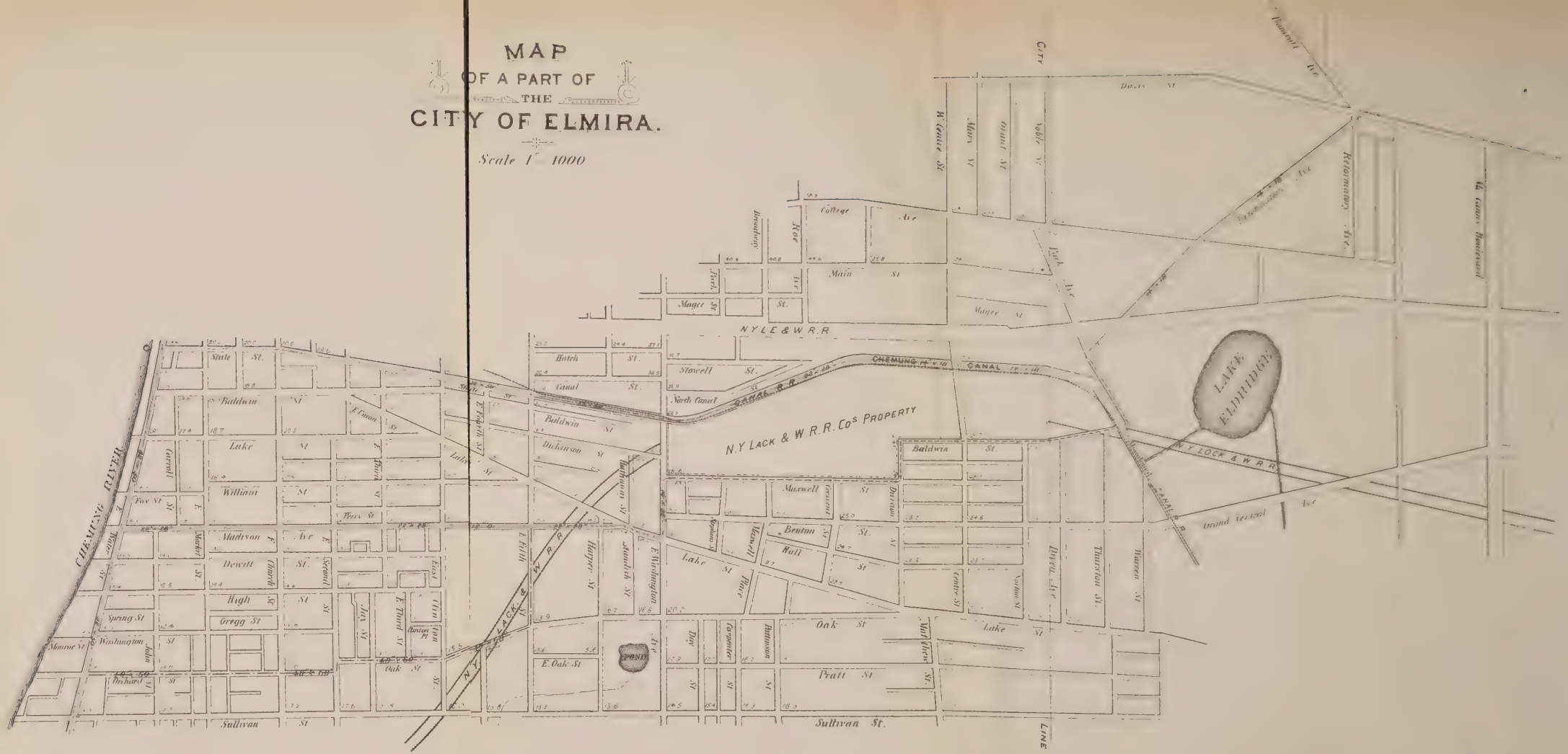
OFFICE OF THE BOARD OF HEALTH,
ELMIRA, N. Y., *January* 7, 1886.

DR. ALFRED L. CARROLL, *State Board of Health, Albany, N. Y.:*

DEAR SIR — At a special meeting of the board of health of this city, held to-day, the following resolutions were unanimously adopted:

MAP
OF A PART OF
THE
CITY OF ELMIRA.

Scale 1" 1000


CHEMUNG RIVER
N.Y.L.E.&W.R.R.
CHEMUNG CANAL
CANAL R.R.
N.Y. LACK & W.R.R. Co's PROPERTY
LAKE ELMIRA
N.Y. LOCK & W.R.R.
Grand Central Ave
N.Y. LACK & W.R.R.
CITY LINE
Main St
College Ave
Maxwell Crescent
Benton St
Hall St
Oak St
Pratt St
Lake St
Sullivan St
Baldwin St
Dickinson St
Stowell St
North Canal
Broadway
Fulton
Hatch St
Canal St
Mayer St
Pine St
Lake
William St
Madison Ave
Dewitt St
High St
Gregg St
Spring St
Washington St
Monroe St
Orchard St
Sullivan St
Oak St
E. Oak St
E. Washington
E. Fifth St
Harper St
Stanton St
Dix St
Carpenter St
Putnam St
Wall St
Pine St
Maxwell St
Benton St
Hall St
Lake St
Center St
Venton St
Irving Pl
Warren St
Thurston St
Irving Ave
Baldwin St
Main St
Mayer St
Pratt St
Sullivan St
W. Gates St
Mary St
Grand St
Cable St
Hamilton Ave
Broadway
Fulton
College Ave
Main St
Mayer St
Pratt St
Hatch St
Canal St
North Canal
Baldwin St
Dickinson St
Stowell St
Lake
William St
Fox St
Water

Resolved, That it is the judgment of this board that the pollution of the wells from the contents of the Reformatory sewer, and the existence of gas in public school No. 4, in the Seventh ward, and in quite a large number of dwelling-houses, stores and buildings, all proceeding from the washing of oil gas at the New York State Reformatory, is detrimental to public health, and should be *immediately corrected.*

Resolved, That a communication be addressed to the State Board of Health, setting forth briefly the state of facts relative to the escape of gas and other contents from the State sewer in the seventh ward, and the said Board use means without delay to investigate the alleged nuisance before the public health is further endangered thereby.

Resolved, That the Secretary be instructed to transmit the above to the State Board of Health with a brief explanation of the existing circumstances.

In way of explanation I would respectfully add: The Elmira board of health to-day visited a large number of dwellings and stores along the line of the sewer. In several places the escape of gas from the sewer has made the places almost uninhabitable. A large number of wells have been affected by the sewer, and in many instances the people residing near by have been left entirely without water that is fit for use. The water was found to be tainted at a distance of over 300 feet from the sewer. A large public school building has the gas in extensive amounts, and the complaints from citizens are growing numerous and vehement. It appears evident that the damage will be extensive if some immediate remedy is not found.

Yours very respectfully,

EDSON C. GEORGE,

Secretary of Elmira Board of Health.

Consulting Engineer's Report.

To the Committee on Drainage, Sewerage and Topography.

The Secretary has referred to me a communication from the board of health of the city of Elmira, complaining that the new Reformatory sewer recently built, and originally planned in accordance with the advice of the State Board of Health, has created a nuisance in the northern part of Elmira, by causing the escape of gas into the cellars of a public school and a number of other buildings.

The gas mentioned is said to be produced from the washing of oil gas at the New York State Reformatory. I have already through an inspector been informed of the conditions attending this escape of gas. The facts concerning this Elmira sewer are briefly these:

On complaint of the city authorities at Elmira in the summer of 1884 the prism of the abandoned Chemung canal running through that city was examined and found to be practically an open cess-pool nearly half a mile long, the water standing in this prism at a level

with the ground water of the surrounding tracts. The pollution of this water in the abandoned canal prism was endangering the health of the city in two ways; first, by the contamination of the air, and secondly, by the fact that it polluted the ground water which flowed through the loose soil of the northern part of Elmira. This pollution of the ground water doubtless affected the ground air, and so both the ground water and the ground air which reached the cellars and the wells were endangered by the canal prism.

The principal cause of the contamination of a long section of the canal prism was the leaking of the Reformatory sewer which was open at every joint, and laid so near the surface of the ground that it was impracticable to keep it in proper condition. After carefully considering all the circumstances, I found that in order to construct a proper sewer it would be necessary to change the route and lay the sewer in one of the public streets of Elmira, giving it outlet into the city sewer system. I so recommended to your committee.

In accordance with these recommendations, the then existing condition of the Chemung canal prism was declared to be a dangerous nuisance, and it was recommended that provisions should be made by the State for laying a proper sewer in one of the public streets of Elmira, where it would always be accessible for examination and repair, and where it could be covered with not less than five feet of earth. The last Legislature made appropriation for this work with the proviso that it should not be executed without the consent of the city of Elmira, and unless it would undertake, when the work was completed, the future maintenance of the sewer, which should then become city property, but through this sewer the Elmira Reformatory should always have the privilege of disposing of its sewage.

During the early part of the summer of 1885, the common council of Elmira passed an ordinance prescribing the route which should be followed by this sewer, and the method of its construction. They declared that it must be built of cement pipe, in accordance with the method followed in the other city sewers. They appointed the assistant city engineer inspector of the work, to see that the wishes of the city were thoroughly carried out.

The sewer was constructed on the route laid down by the city of Elmira, and in the way described in the city ordinance, under the direction of the Superintendent of Public Works of the State. The assistant city engineer, appointed by the mayor, inspected the work and declared on its completion that it was properly done. Mr. O. S. Wilson was the engineer in charge for the Superintendent of Public Works.

The work was done under contract, and from the efficiency of the double supervision I think there is every reason to believe that there is no better cement pipe sewer in Elmira. Where the sewer joins the city system it is below the level of the ground water. As it goes northward it rises gradually above the level of the subsoil waters, and in the region where the gas nuisance is complained of, it enters a soil composed of coarse dry gravel containing almost no

loam or clay. Through this coarse gravel the air circulates as freely as through a heap of stones. The surface of the ground is now frozen. The strong odors of the gas waste escape through the joints of the sewer, and finding no outlet through the frozen surface, are drawn through the currents of ground air toward the cellars of heated houses and the wells, which form the chimneys for the escape of the ground air.

The odors of this gas waste is almost as permeating as that of the oil of peppermint. It easily penetrates two or three hundred feet through the dry gravel, and doubtless is an offensive nuisance in the district from which the complaint comes.

The fault in this matter cannot be laid to the construction of the sewer. No cement pipe sewers are air-tight, nor do they even approximate to such a condition. Where these sewers are laid in a clay or other compact soil, the air from them does not penetrate into the soil to any great distance from the sewer, but where the soil is a coarse dry gravel it is not possible to prevent the air from escaping from cement pipe sewers, and going wherever the underground currents traverse the soil.

In the case of the Elmira sewer there is but one means of remedying the offensive nuisance complained of, and that is to keep the gas refuse out of it.

I do not believe it practicable to so ventilate this sewer as to prevent the odor from the gas wastes from penetrating the soil and affecting the ground water and the ground air, especially in winter when the surface is frozen, and when the currents of ground air necessarily set strongly toward both cellars and wells, nor do I think it practicable to build an *air-tight* cement pipe sewer in this coarse, gravelly soil.

There is no reason to suppose that this sewer is not one of the best of its kind, but from the fact of its traversing this coarse and peculiarly porous soil above the level of the ground water it is evident that it will not answer for the disposal of the gas wastes. I recommend that these facts be set before the board of health of the city of Elmira, and the authorities of the Elmira Reformatory, with the hope that they may agree upon a method of gas waste disposal which will cause no nuisance to the city of Elmira.

Very respectfully yours,

JAMES T. GARDINER,
Consulting Engineer.

At a special meeting of the State Board of Health, held on the 14th of January, 1886, the drainage committee submitted the above report of Consulting Engineer Gardiner, and recommended its adoption.

On motion, it was

Resolved, That the report and recommendations of the Consulting Engineer on the State Reformatory sewer at Elmira be and hereby are approved and adopted.

Resolved, That copies be sent to the board of health of the city of Elmira, and to the superintendent of the Elmira Reformatory.

ALFRED L. CARROLL, M. D.,
Secretary.

January 15, 1886.

THE DRAINAGE OF THE PRISM OF THE ABANDONED CHEMUNG CANAL BETWEEN THE VILLAGES OF NORTH ELMIRA AND PINE VALLEY.

The committee herewith report to the Board the plan recommended in the annexed report of Consulting Engineer James T. Gardiner, and recommend its adoption and approval, the work to be executed by the Superintendent of Public Works under chapter 470 of the Laws of 1885.

ERASTUS BROOKS, *Chairman.*
GEORGE W. COOKE.
E. M. MOORE, *President.*
ALFRED L. CARROLL, *Secretary.*

Consulting Engineer's Report.

To the Committee on Drainage, Sewerage and Topography:

GENTLEMEN — In accordance with the direction of the committee, I examined, on September 16, that part of the abandoned Chemung canal which lies between the villages of Pine Valley and North Elmira to determine upon a plan for the drainage of this part of the abandoned canal. A survey of this locality had been executed by Mr. Wilson for the State Board of Health in 1884. From the data furnished by this survey, it appears that there are two feasible methods of draining that part of the canal prism which is now a swamp. The cheapest method, however, and that most likely to be permanent in its results, is undoubtedly to ditch the center of the prism from the town line of Veteran and Horseheads down to a point designated on Mr. Wilson's map as being just north of the land owned by Peter Adams. At this point a cut is made from the canal prism to the creek. A ditch already exists from this cut for several thousand feet to the southward. It is not thoroughly operative for the reason that the outfall into the creek is not sufficiently low, owing to the elevation of the surface water in the creek, nor is the ditch of sufficient width or proper grade.

After carefully examining the various possibilities I recommend that from the land of Peter Adams to that of John Dilmore near lock No. 44 the bed of the creek be so cleaned out as to lower the water surface at least two feet at the north line of Peter Adams' property; that the present outfall ditch from the canal into the creek be so enlarged and graded as to form a permanent outfall for the drainage of the abandoned canal; that from this outfall, which is situated on the land marked on Mr. Wilson's map as belonging to John Banks, near the southern line of his property, a ditch two feet wide on the bottom be excavated in the center of the canal prism to the town line of Veteran and Horseheads, where the bottom

of the ditch should be four feet below the present water surface. From this point the ditch should have a uniform fall to the outlet. South of this point the canal prism should be ditched as far south as the means provided will allow, and with such fall as the grade permits.

The cleaning out of the creek bottom from the outlet of the canal ditch down to lock No. 44, and the improvement of the channel should be such as to permanently lower the water at least two feet. I feel quite confident that this plan, if properly executed, will afford permanent relief to this region and result in the reclamation of a large amount of valuable land adjoining the canal.

Very respectfully yours,

JAMES T. GARDINER,
Consulting Engineer.

At a meeting of the State Board of Health on September 24, at Albany, the above report was presented, and on motion was adopted by the Board, its recommendations approved, and a copy ordered transmitted to the Superintendent of Public Works.

ALFRED L. CARROLL, M. D.,
Secretary.

The following documents show a modification of plans, and the reasons therefor:

ALBANY, *January* 4, 1885.

Hon. ERASTUS BROOKS, *Chairman Committee on Drainage, Sewerage and Topography:*

DEAR SIR — I have the honor to recommend that the plans for the drainage of the prism of the abandoned Chemung canal in Pine Valley be modified as follows: Instead of giving outlet to the drainage ditch down the center of the canal into the creek about a mile above the lock, as originally intended, I recommend that the ditch be carried on down the center of the canal to a point not far above the lock where a cut has already been made from the canal to the creek, and that this be made the outlet for the drainage of the canal prism. All other connections between the canal and the creek above should be closed. The ditch should have such slopes as will maintain themselves in the different material traversed.

As respects the work at Havana, I recommend that the culvert under Ayers street be made large enough to carry off water which overflows from the creek in time of flood, and that the pipe drain laid in the bed of the canal be extended up to the dive culvert, there to receive the surface drainage from the prism above. I recommend that the prism above the dive culvert be drained by a a surface ditch rather than by subsoil drains, as at first proposed. This change is made on account of Mr. Wilson's report that the quicksands under the canal bed would soon fill up the subsoil drains.

As this matter was referred by the Board to the committee with

power, and as the Superintendent of Public Works is anxious to proceed at once to complete the work, will you, if you approve the recommendation, kindly return this letter with an indorsement that the modifications of the plans are adopted?

Very respectfully yours,

JAMES T. GARDINER,
Consulting Engineer.

The question of modifying the plans for the drainage of the prism of the abandoned Chemung canal having been referred, with power, to the committee on drainage, sewerage and topography, the above recommendations of Mr. Gardiner have been approved by that committee.

ERASTUS BROOKS, *Chairman.*
GEORGE W. COOKE.
E. M. MOORE, *President.*
ALFRED L. CARROLL, *Secretary.*

At a special meeting of the State Board of Health on the 14th January, 1886, the above report of the drainage committee was approved and adopted.

ALFRED L. CARROLL, M. D.,
January 15, 1886. *Secretary.*

REPORT CONCERNING COMPLAINT FROM THE TOWNSHIP OF FLORIDA, MONTGOMERY COUNTY.

To the Secretary of the State Board of Health:

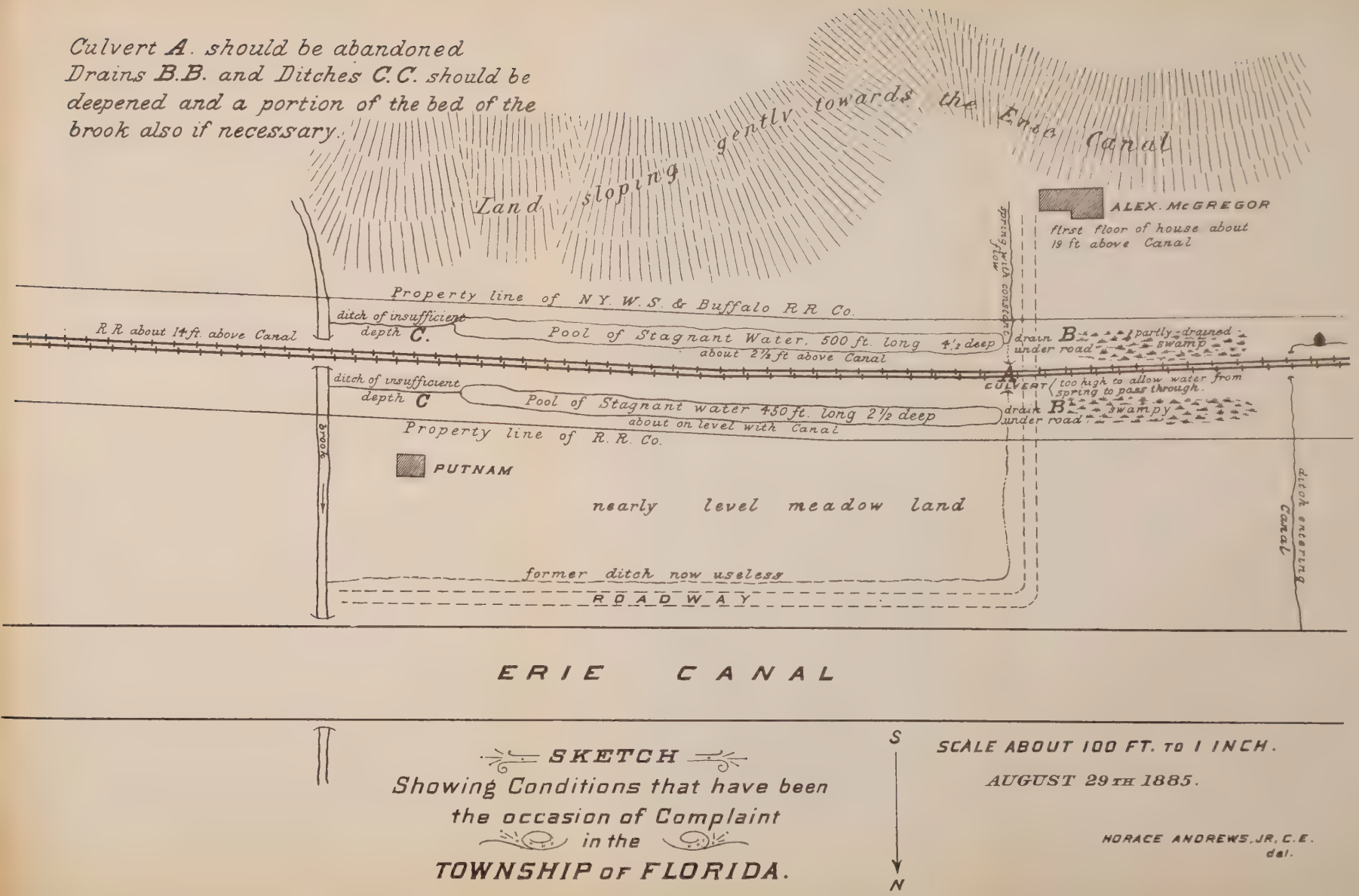
SIR — In accordance with your instructions I have examined the conditions that have been the occasion of complaint, in the township of Florida, Montgomery county, and herewith present my report.

The pools of stagnant water described in the complaint had received recently a large amount of rain-water, hence they were somewhat improved in appearance, otherwise the conditions appeared to be as described in the complaint.

The house of Mr. Alex. McGregor, the petitioner, is situated upon the south side of the Erie canal and about 360 feet from it. The land slopes gently to the north, and formerly was effectually drained by a ditch running parallel to the canal and passing under the latter by means of a culvert about 700 feet east of Mr. McGregor's house. When the New York, West Shore and Buffalo railroad was built an embankment ten or twelve feet in height was constructed about 100 feet north of the house and between it and the canal.

Ditches were indeed dug on each side of the embankment with the design of leading off the water, but these are very shallow and accomplish this object very imperfectly.

Mr. E. H. Putnam, a surveyor, has found the level of the water in the ditch nearest the house to be two and a half feet higher than in the ditch nearest the canal; the level of the water surface in the


Culvert A. should be abandoned
Drains B.B. and Ditches C.C. should be deepened and a portion of the bed of the brook also if necessary.
Land sloping gently towards the Erie Canal
ALEX. McGREGOR
first floor of house about 19 ft above Canal
Spring flow constant
Property line of N.Y.W.S. & Buffalo R.R. Co.
R.R about 14ft. above Canal
ditch of insufficient depth C.
Pool of Stagnant Water. 500 ft. long 4½ deep
about 2½ ft above Canal
drain B under road
partly drained swamp
CULVERT (too high to allow water from spring to pass through.
ditch of insufficient depth C
Pool of Stagnant water 450 ft. long 2½ deep
about on level with Canal
drain B under road
swampy
Property line of R.R. Co.
Brook
PUTNAM
nearly level meadow land
former ditch now useless
ROADWAY
ditch B
Canal
ERIE CANAL
SKETCH
Showing Conditions that have been the occasion of Complaint in the
TOWNSHIP of FLORIDA.
S
N
SCALE ABOUT 100 FT. TO 1 INCH.
AUGUST 29TH 1885.
HORACE ANDREWS, JR. C.E. del.

latter ditch was very nearly the same as in the canal at the time of my visit.

The evidence is very clear, therefore, that the railroad embankment has caused the level of the ground water in the immediate vicinity of Mr. McGregor's house to be considerably raised; moreover the water being held from flowing off varies slightly in level from time to time as it is evaporated, or augmented by rains, so that the conditions seem favorable for the malarious complaints that exist.

In the present instance there would seem little difficulty in thoroughly draining the ditches according to the plans suggested by the surveyor, Mr. E. H. Putnam. Care should be taken that the ditches are of sufficient depth to accomplish their object, and after being dug they should be kept clean. The drain-pipes designed to lead the water under the roadway leading to Mr. McGregor's house are too high and should be lowered considerably, otherwise the land lying immediately in front of the house can receive no benefit from an increased depth of ditching.

The accompanying sketch illustrates the conditions described in this report.

Very respectfully yours,

HORACE ANDREWS, JR.,

ALBANY, *August* 29, 1885. *Civil Engineer.*

LATER REPORT ON THE SAME SUBJECT.

To the Secretary of the State Board of Health:

SIR — In accordance with your instructions I have again examined the ditches in the vicinity of the house of Alex. McGregor, in the township of Florida, Montgomery county. My first examination of the nuisance in question was made on August 28, 1885, and I shortly after submitted a report to you. In accordance with recommendations then made, the local board of health obtained from the New York, West Shore and Buffalo railroad a promise that the matter would receive attention.

Upon the occasion of my second visit, on November 10, 1885, I found that the railroad company had taken steps to remedy the evils complained of, and had promised to complete the work as soon as practicable. There is no doubt that the nuisance could have been effectually abated within a few days, by more prompt action on the part of the railroad officials.

Owing to the recent heavy falls of rain and the lateness of the season, the work required cannot now be prosecuted without considerable inconvenience, while the conditions at present existing can hardly be detrimental to health during the winter months.

It would, therefore, appear that the assurances of the local board of health that attention will be directed to the nuisance early in the spring, and that the recommendations of your Board will then be promptly and thoroughly carried out, should be accepted, and the

railroad company may properly be allowed to wait till the winter is past before completing the needed improvements.

It would be advisable for the railroad company to commence their operations by taking the necessary levels and completing the outlet ditches first, in order of time, after which the wide ditches could be filled to the former level of the land with advantage, thus avoiding the necessity of any deep ditching at the outlets.

Very respectfully yours,

HORACE ANDREWS, JR.,
Civil Engineer.

ALBANY, *November* 11, 1885.

PLAN FOR THE DRAINAGE OF THE ABANDONED CHEMUNG CANAL IN THE VILLAGE OF HAVANA.

The committee herewith submits to the Board the plan approved by Consulting Engineer James T. Gardiner, for the drainage of the prism of the abandoned Chemung canal in the village of Havana, the drainage of which is, by chapter 470 of the Laws of 1885, to be done by the Superintendent of Public Works, under the advice and direction of the State Board of Health.

The committee approves the plan of Consulting Engineer Gardiner, and recommends its adoption by the Board.

ERASTUS BROOKS, *Chairman*,
GEORGE W. COOKE,
E. M. MOORE, *President*,
ALFRED L. CARROLL, *Secretary*,
Committee.

Consulting Engineer's Report.

To the Committee on Drainage, Sewerage and Topography.

GENTLEMEN — In accordance with your directions I visited the village of Havana on the 16th of September, to determine on a plan for the drainage of the prism of the abandoned Chemung canal, in the village of Havana, in order that the Board might approve of a plan to be carried out by the Superintendent of Public Works, in accordance with chapter 470 of the Laws of 1885.

In January last, this village had been visited and examined by O. S. Wilson, C. E., acting for the State Board of Health, and on his examination, the State Board of Health, on the 17th of February, 1885, declared that the condition of the prism of the abandoned canal in Havana was a nuisance, and recommended its drainage substantially in accordance with the plan then submitted by Mr. Wilson.

I examined the ground, and fully concur in the conclusion reached by Mr. Wilson that a part of the canal prism, especially that lying south of South street, is a nuisance, dangerous to life and detrimental to health.

From this point southward for a distance of some 2,400 feet, the

prism of the canal is excavated below the level of the ground water, and the water which fills this part of the canal is, therefore, not surface water, which is drained into it, but sub-soil water which stands at this level. The rapid growth and decay of a large amount of vegetation in this water, the surface of which fluctuates with the ground water, produces conditions most favorable to the development of malarial disease. This condition can only be remedied by filling the prism to a height several feet above the level of the ground water, or by draining; that is by such drainage as will lower the surface of the ground water below the bed of the canal. The latter course, that of drainage, is decidedly the cheaper, and has the added advantage, from a sanitary point of view, of providing for the storm water that will naturally accumulate in such a depression at certain seasons. The lowering of the ground water of this part of the village will doubtless be a benefit to the health of the people.

This sub-soil drainage of the part of the prism to the south of South street can best be accomplished by laying two lines of agricultural drain tile along the bed of the canal. The tile should be of a diameter of six inches. To give outfall to these drains it will be necessary to lay a drain from South street to the south end of Lock No. 1, a distance of some two thousand feet, and then to run a culvert, which may be also of drain pipe, under Ayres street. The drain from South street to Lock No. 1 should be of best salt glazed vitrified pipe, twelve inches in diameter. The culvert under Ayres street should be eighteen inches in diameter. A catch basin should be placed at the junction of the sub-soil drains and the main outfall drain just south of South street, with the bottom of the manhole below the level of the drain for catching any silt that may come down.

Mr. Wilson's original plan provided for the carrying of a twelve-inch drain through to the water on the south side of Ayres street, and for the filling of Lock No. 1; but this does not seem to me necessary, as the lock itself is considered a proper outfall for the water. A good current will be created through it by the admission of the water from the drain at its south end, while at its north end a large culvert will connect it with the old canal prism, which has now become as it were a branch of the lake.

The use of the lock as an outfall will considerably reduce the cost of the work. The fall from South street to Lock No. 1 provided for in his plan, a map of which I append, is ample. It is about one foot in a thousand. I, therefore, recommend for the approval of the committee the plan submitted by Mr. Wilson with the modification that the outlet should be into Lock No. 1 rather than into the canal at the north side of Ayres street, and that a culvert be placed under Ayres street, and that the lock excavation be left open.

Very respectfully yours,

JAMES T. GARDINER,
Consulting Engineer.

At a meeting of the State Board of Health on the 24th of September, the above report was presented, and on motion was adopted by the Board and its recommendations approved, and a copy ordered transmitted to the Superintendent of Public Works.

ALFRED L. CARROLL, M. D.,
Secretary.

DRAINAGE OF A SWAMP IN THE TOWN OF WESTCHESTER, NEAR CLASON'S POINT.

A petition having been received from property-owners in the town of Westchester, and the president of the trustees of the school district interested, asking for an investigation into the condition of a tract of marsh between the estate of William Watson and Clason's Point, which it is alleged is affecting the public health, Consulting Engineer James T. Gardiner was directed to examine into the matter and report to the committee. His report, which is approved, is hereto appended. In accordance with the suggestions we recommend that the Board declare the condition of the tract of marsh crossed by the highway, and lying between the estate of William Watson and Clason's Point, to be a nuisance, and recommend the drainage of the tract under a commission appointed by the court, in accordance with the provisions of the general drainage law, chapter 888 of the Laws of 1869, and the amendments thereof.

ERASTUS BROOKS, *Chairman*,
GEO. W. COOKE,
E. M. MOORE, *President*,
ALFRED L. CARROLL, *Secretary*,
Committee.

Consulting Engineer's Report.

To the Committee on Drainage, Sewerage and Topography:

GENTLEMEN — In accordance with your directions I visited the town of Westchester to examine a large piece of marsh land lying between the estate of William Watson and Clason's Point.

The piece of marsh of which complaint is made to the State Board of Health is crossed by the main road between the estate of William Watson and Clason's Point. The road crosses the marsh on a causeway. There are said to be some hundreds of acres here which are now so flooded at high tide that the land is kept continually saturated. My visit was made at about low tide, for the purpose of seeing the swamp in its worst condition. The rapid growth and decay of vegetation has caused such a deposit of decomposing matter that a very offensive odor is perceived at the road even in cool weather. This condition of things is alleged to be of comparatively recent origin. Some distance below the road at the southern edge of the swamp two rocky promontories come out from either side, quite close to the stream which drains the central part of the marsh.

Here a short dam or dyke has been constructed crossing the marsh. Formerly a tidal gate was maintained by the town which was said to be effective in keeping back the flood tides so that the marsh was rarely submerged. The surface of the marsh was so far above the low tide line as to drain itself if not constantly saturated. It is said that when the flow of the tide was kept out by the tidal gate, the surface of the marsh was drained and was covered with a fine growth of grass which the owners were in the habit of mowing. Certainly if this is the case the former condition was far more sanitary than that which exists at the present time; for there can be no doubt that the present condition of the marsh is liable to affect the health of those living or coming within the reach of its miasmatic influences. A public school has recently been erected quite close to the swamp, and I see that the president of the board of school trustees is one of the complainants in this matter.

No one familiar with sanitary investigation can doubt that the present condition of the swamp is a nuisance and that its drainage and reclamation to such an extent as to convert it into a meadow would be a material advantage to the public health; and it would further seem that the method formerly practiced of keeping out the flood tides by the tidal gates, while letting the waters of the swamp flow out at low tide, would be an efficient remedy for much of the present evil, provided that in connection with such work the swamp was thoroughly ditched as it was said to have been formerly.

It is said that the town became tired of maintaining the tidal gate at the mouth of this swamp under the impression that the main benefits accruing were enjoyed by the owners of the land reclaimed and not by the township at large.

It is true that the owners of the swamp and the owners of the land immediately adjoining the swamp were probably very largely benefited by the tidal gate, but the township at large was also benefited in the matter by the condition of the highway or causeway crossing the swamp. This causeway is now flooded at very high tides, and the road upon it damaged. It also appeared to me that owing to the saturation or softening of the swamp the causeway was in places settling into the muck. It is probable, therefore, that the drainage of the swamp would make the repairs upon the road less costly; but in addition to this there would be a benefit to the health of the people of the neighborhood, to the children attending school, and also a benefit by the removal of the danger which now exists in greater or less degree to the health of persons constantly traversing the highway.

It, therefore, appears that the benefits of the reclamation of this swamp would be enjoyed both by the town at large and by the owners of the swamp and adjacent property. Since the benefits are thus distributed it would be equitable that the cost of constructing and maintaining this work should be distributed between the town and the private owners in proportion to the benefits received.

It would seem probable that the execution of the work and the

distributions of the cost of this drainage could best be accomplished by a commission appointed by the court under the General Drainage Act. I, therefore, recommend that the Board declare the present condition of the marsh in the town of Westchester between the property of the estate of William Watson and Clason's Point a nuisance, and recommend that its drainage be secured by those interested by an appeal to the courts under the General Drainage Act, chapter 888 of the Laws of 1869, and its amendments.

Very respectfully yours,

JAMES T. GARDINER,
Consulting Engineer.

At a meeting of the State Board of Health on 24th of September, at Albany, the above report was presented, and on motion was adopted by the Board, its recommendations approved, and the swamp in question was declared to be a nuisance and its drainage recommended, as set forth in the report.

ALFRED L. CARROLL, M. D.,
Secretary.

ALBANY, *October* 2, 1885.

To F. A. WATSON *and others, petitioners*, 99 *Franklin St., New York City:*

GENTLEMEN — In response to your petition, examination has been made of the swamp between the property of William Watson and Clason's Point, and the result of such examination with recommendations for remedying have been reported to the Board and approved by it. A copy of the report and recommendations so approved is herewith inclosed with the hope that you will be successful in securing the abatement of the nuisance by the methods suggested.

Very respectfully yours.

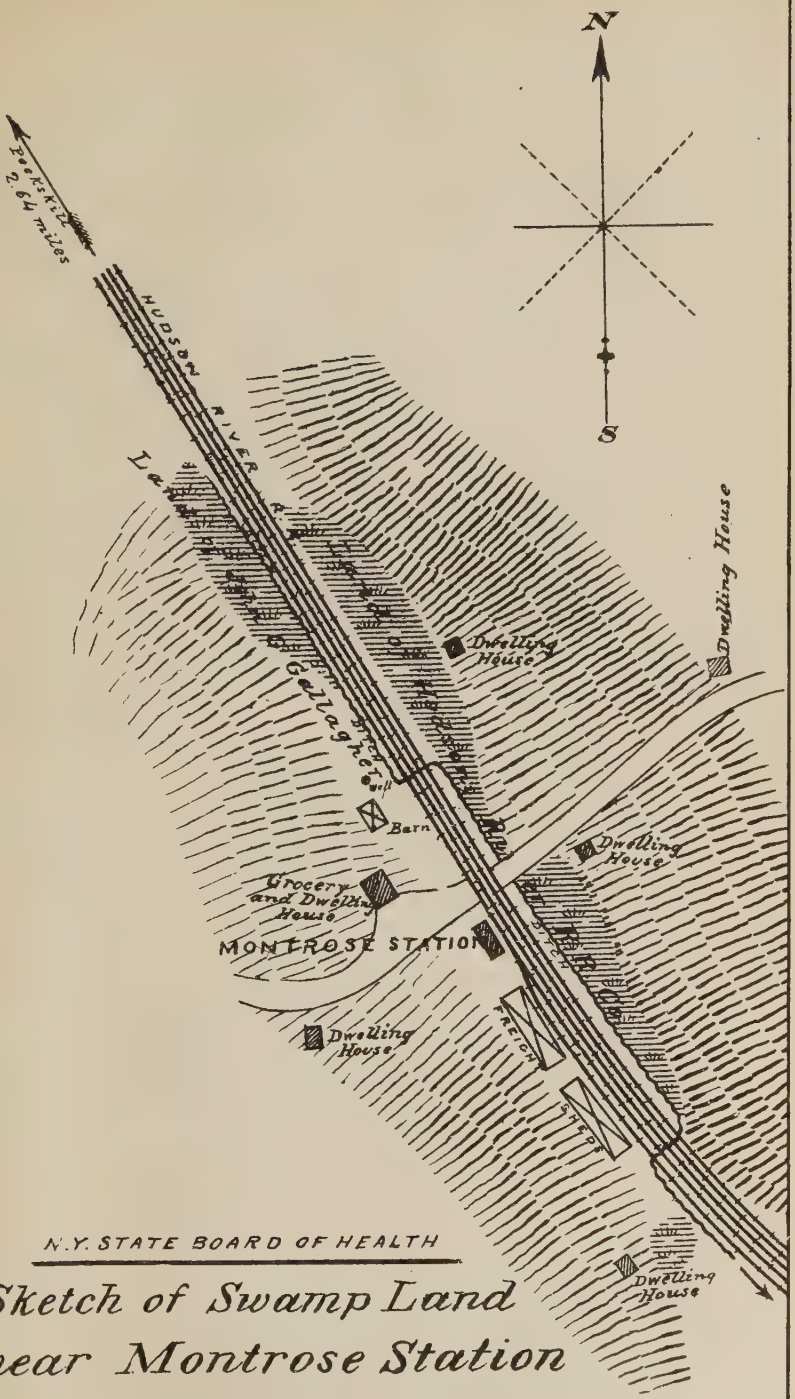
ALFRED L. CARROLL, M. D.,
Secretary.

REPORT UPON A NUISANCE OCCASIONED BY SWAMP LANDS AT MONTROSE STATION, WESTCHESTER COUNTY.

To the Secretary of the State Board of Health:

SIR — In accordance with instructions received from the State Board of Health, I have examined into the causes of complaint that have recently been the subject of communication to the State Board of Health, on the part of the local board of health of the township of Cortlandt, Westchester county. My report relative to the complaint is herewith submitted:

In the immediate vicinity of Montrose Station, on the New York Central and Hudson River railroad, the railroad passes through a small swamp lying between rocky hills. This swamp is said to have



WEED PARSONS & CO. PHOTO-LITH

occasioned trouble by causing a settling of the track, the indications being, therefore, that it is of some depth.

That part of the swamp lying to the east of the railroad, and covering perhaps a little over an acre, is said to be the property of the railroad company, while the portion on the west side of the railroad, covering about three-quarters of an acre, is owned by John G. Gallagher.

The swamp land is partly drained by a ditch running along the railroad tracks, and crossing them twice through open sluice-ways, with wooden sides. Neither the ditches or sluice-ways are of sufficient depth to drain the swamps with any degree of thoroughness, but they probably remove the large accumulations of water in spring and during heavy rains.

Swamps of the character of the one mentioned are quite common in the neighborhood, and it is the testimony of the health officer that malarious complaints, which are widely prevalent, are often attributed to the exhalations from the swamps. The conviction that these wet and marshy lands are naturally the causes of malaria is strengthened by the fact that there was formerly a large swamp near Verplanck's Point, in the near neighborhood, which has been converted into a pond by damming, and malarious complaints which were general near its borders have nearly ceased since the land has been entirely flooded.

Within four or five hundred feet of the swamps at Montrose Station there are at least six dwelling-houses, with from twenty to thirty inmates; it was stated by the health officer that malarious complaints had been known to occur in all of these houses, and that their proximity to the wet lands was supposed to be the cause of the illness.

It may be fairly assumed, therefore, that the swamps in question are a nuisance, and in their present condition are detrimental to the public health. By deepening the ditches and sluice-ways to a suitable extent, or by partly filling the swamps, it is probable that complaints of a malarious nature will be less frequent. It would, therefore, seem proper for those interested to take such steps as may be necessary, acting under the general drainage law of the State, to secure the thorough drainage or reclamation of the swamps that are the subject of complaint.

Very respectfully yours,

HORACE ANDREWS, JR., *C. E.*

ALBANY, *May* 5, 1885.

ALBANY, *August* 20, 1885.

To the President of the Board of Health, Rhinebeck, N. Y.:

SIR — The accompanying petition, signed by a number of residents of your village, is received at this office. To permit the renewal of a nuisance officially condemned and ordered to be abated but two years ago, as shown by the records of your board, is a

procedure calculated to bring discredit upon sanitary administration, and, if the facts be as represented by the petitioners, to endanger the health of your village, where soil saturation has long been a serious evil.

You are, therefore, requested, under the provisions of section 3 of chapter 270 of the Laws of 1885, to convene your board forthwith, and take measures to prevent the flooding of land which has been drained expressly for sanitary reasons.

ALFRED L. CARROLL, M. D.,
Secretary.

To the Board of Health of the State of New York:

We, the undersigned residents of the village of Rhinebeck, respectfully petition the Board of Health of the State of New York to take notice of and prohibit the creation of a nuisance and an injury to the health of this village and town, to-wit:

That on or about the 8th day of May, 1883, the board of health of the village of Rhinebeck, having, on the petition of a number of the inhabitants, investigated the condition of the property known as the mill-pond, passed the following resolution:

"*Resolved*, That the health officer be directed to serve on Mrs. Alice Huntington, the owner thereof, an order requiring her to effectually remove the mill-dam within thirty days from the receipt thereof, and to ditch and drain the marshy places as soon as practicable."

That in pursuance of said order, given under said resolution, the owner of said dam removed the same and caused the said marshy places to be ditched and drained in conjunction with another owner of land, formerly covered by water.

That the present board of health of this village have given permission to the owner of an ice-house, adjoining this land, to erect a dam, and that said intended dam is about being erected.

That said dam will restore the nuisance that formerly existed and be detrimental to the health of our citizens. We, therefore, pray that your honorable Board will investigate and examine into our complaint, and give such order and direction that to your Board may seem just and proper.

Dated RHINEBECK, *August* 19, 1885.

ALBANY, *September* 10, 1885.

F. M. SMITH, Esq., *President of the Board of Health, Rhinebeck, N. Y.:*

DEAR SIR — I transmit, for your information, a copy of a report on the condition of the old mill-pond by Inspector Andrews, who corroborates the conclusions of your board as regards the precautions to be observed in the reconstruction and maintenance of the dam, and whose recommendations will be of practical service in carrying out the resolutions which you have wisely adopted.

PLAN OF
THE CENTRAL PORTION
OF THE
VILLAGE OF RHINEBECK.

SCALE 20 RODS TO ONE INCH.

The greatest danger to health undoubtedly arises from the alternate flooding and exposure of land so situated, and it is to be hoped that your prohibition against drawing down the water will be rigorously sustained. With a minimum influx of nearly 200,000 gallons *per diem*, it seems evident that by following the suggestions of Mr. Andrews the pond can be kept at a nearly permanent level in all seasons and serious peril thereby avoided.

Faithfully yours,

ALFRED L. CARROLL, M. D.,
Secretary.

REPORT CONCERNING THE OLD MILL-POND AT RHINEBECK, DUTCHESS COUNTY.

To the Secretary of the State Board of Health:

SIR — In accordance with your request, on the 7th of September, I made an examination of the swampy land covering the site of the old mill-pond, at Rhinebeck, Dutchess county, and herewith submit my report, with accompanying plan of a portion of the village of Rhinebeck.

A stream, called "Landsman's Kill," flowing through Rhinebeck, has a considerable water-shed and a somewhat rapid descent, so that at various available places it has been dammed for manufacturing purposes. At the present time, however, many of these water powers have been abandoned, although not from any insufficiency of water.

The old mill-pond in the village of Rhinebeck has been dry, except in the late fall, winter and spring, for a number of years, and its bed is now swampy and covered, for the most part, with a rank growth of weeds. The dam at this pond has now been re-erected in an apparently substantial manner, and it is proposed to again flood the land, as in former times.

The flow of "Landsman's Kill," at the time of my visit, was about ninety gallons per second, by a rough measurement, but, according to the testimony of residents, in times of drought it may be diminished to about one-quarter of this, or twenty-two and one-half gallons per second. In a pond, covering about six acres on the land of Mr. George Miller, several miles further up stream, on the day of my visit, the water was flowing rapidly over the crest of the dam for a width of nearly twenty-five feet and to the depth of three inches. It is stated that in the driest seasons the water still flows over the crest of the dam to the depth of one-half an inch on the entire length of coping.

The area of the mill-pond at Rhinebeck, when again flooded, would be, perhaps, four and a half acres, and the water would be quite shallow in places, not averaging over four or five feet in depth over the whole pond. It would, therefore, seem that Landsman's Kill supplies an abundance of water to keep the pond full, even in the driest weather, if it is not drawn down for manufactur-

ing purposes, and sufficient to renew the entire volume of water often enough to prevent stagnation.

It would be very difficult to drain the swampy land in the bed of the mill-pond, in an effective manner, without deepening the bed of the creek. As the creek flows over rock in places, such deepening would be very expensive. At present the old-mill pond would seem to be in a very bad condition for sanitary reasons; the land is alternately flooded and dried, and, as before stated, its thorough drainage would be a difficult task. The pond could be kept flooded to a very nearly uniform level with proper precautions. The width of coping at the overflow on the crest of the dam should be about twenty feet, and ample provision should be made for the escape of the waters of freshets over a much greater width of coping. If gates are left in the dam, to draw the water down when necessary, they should be well secured from being improperly used, and they should never be used except in a case of necessity, with the knowledge and consent of the board of health. It would be essential, moreover, that the water should not be drawn down for manufacturing purposes, but that only the overflow from the crest of the dam should be used.

Most of the vegetation growing on the old bed of the mill-pond could be cut down and burnt off before water was admitted, while that which would be left, being constantly submerged, would not be objectionable.

If either the entire flooding of the old bed of the mill-pond or its thorough drainage is to be attempted, the former would seem the more practicable, for the land can be kept submerged to a constant level with much greater ease than it can be drained.

Careful supervision would have to be exercised if a number of ditches were to be kept in good order over an area of several acres; while it would be at once apparent if the water were being improperly used so as to cause fluctuations of level in case the dam should be again maintained.

Very respectfully yours,

HORACE ANDREWS, JR., *C. E.*

ALBANY, *September* 9, 1885.

REPORT ON SANITARY MEASURES FOR GOUVERNEUR.

To the Committee on Drainage, Sewerage and Topography:

Appeal having been made by prominent citizens of Gouverneur to the State Board of Health to investigate the prevalence of diphtheria, which was claimed to be epidemic in that vicinity, Dr. F. C. Curtis of this Board visited Gouverneur on the 4th of December, and investigated the sanitary condition of the village, and the physical conditions which might have a bearing upon the health of the people. His report has been made to the sanitary committee and by it referred to the committee on drainage, sewerage and topography. Since it is evident from Dr. Curtis' report that the

question involved is one of drainage and water supply, Dr. Curtis' findings and the whole question have been referred to me. I had intended to make a personal examination of the ground, but after examining a map of the place and a topographical view brought by Dr. Curtis, and after consultation with him I find myself in possession of enough facts to warrant a conclusion as to the general outlines of the sanitary difficulties and of the remedies to be applied. A detailed statement of the methods for remedying the evils found is perhaps not necessary until the people decide that they will remove the insanitary conditions of the place. An examination for a detailed report, especially on the question of water supply, could not properly be made at this season of the year. The object of the present report will, therefore, be to point out the general character of the sanitary improvements needed, without undertaking to discuss the details of the plans.

REPORT.

Modern science has demonstrated beyond question that man's physical life is governed by laws, and that the breach of these laws is surely followed by consequences which, in themselves, are often a terrible punishment to the law breaker. The laws which govern man's life exist and work out their consequences regardless of what we think about them. We may believe or disbelieve their existence; we may shut our eyes and say that we will continue to do as our fathers did before us, and not recognize the discoveries of modern science and live on as if there were no sanitary laws; but many of us forget that these laws go on working out their direful consequences regardless of our belief or disbelief. The proper attitude of mind for all of us is to admit that our physical life is absolutely governed by laws, and carefully endeavor to find out what these laws are. Some have been discovered, some are partly understood, many are yet unknown.

Among those laws of life which may be considered to be absolutely known is the one which most affects the health of the people of Gouverneur, and this is the principle that *soil saturation, combined with filth under and around human dwellings, invariably affects in a serious manner the health of a large portion of the people exposed to such conditions.* This hygienic law has been proved by observation and statistics in so many localities and in so many countries that it is no longer open to discussion.

Accurate vital statistics taken in England before the drainage of cities and villages have been carefully compared with the statistics of disease taken after drainage works had been executed. The comparison invariably showed an enormous decrease in certain classes of disease, these being principally the zymotic diseases and consumption. In Massachusetts the careful researches of Dr. Bowditch demonstrated the serious effects of living over saturated soil in that State. In Gouverneur, Dr. Curtis found the sub-soil waters to be within two feet of the surface of the

ground through a large part of the village. Of course the cellars are damp or contain standing water in many places. This is quite similar to the condition of a large portion of the city of Ogdensburg which I examined last fall. Much of the filth in the privy vaults and cess-pools, and that thrown upon the ground in the yards and streets is rapidly dissolved and passes downward into the ground water. The soil of Gouverneur is, therefore, saturated with dilute sewage which is flowing into the wells and being carried into the cellars by percolation. This dilute sewage is being drunk from the wells by a large portion of the people of the village. It also percolates into the cellars, and the emanations from it are thence carried upward by the warm currents of the house to the living apartments above. These emanations of moisture and filth undermine the resisting power of the constitution, and often carry with them the fatal germs of specific disease.

The soil of a large part of Gouverneur is saturated to within two or three feet of the surface with filthy moisture, which is being drunk and breathed by the people. Specimens of this water have been examined biologically and also tested for chlorine. The water swarms with micro-organisms, and the samples tested showed a large percentage of chlorine, undoubtedly derived from sewage. The investigations of Dr. Curtis as to the prevalent diseases show how seriously the health of Gouverneur is affected by these conditions. The death-rate in this small community is already twenty per thousand. *Thirty-eight* per cent of the total deaths are from zymotic diseases. Fifty per cent of the total deaths are from zymotic diseases and consumption. The percentage of deaths from cerebro-spinal meningitis is seven times what it is in the rest of the State. This death-rate from zymotic disease is almost unparalleled in this State. Even in New York city, with its crowded tenement population, the percentage of deaths from the zymotic diseases, to the total number of deaths, is only 28.4 per cent, while in some cities the percentage of deaths from zymotic disease is from 14 to 16. It is not too much to say that during the last year and a half at least one-quarter of the deaths in Gouverneur could have been prevented by proper sanitary precautions. These needless deaths are the distinct result of the violation of absolute law.

It thus appears from Dr. Curtis' report that the mortality from preventable diseases in Gouverneur for the last year and a half has been most excessive, and the nature of the diseases, together with the conditions observed, prove that the mortality is principally due to the saturation of the soil with polluted water. In view of these facts I will briefly state the outline of the measures which will most effectually remedy the sanitary evils from which the people of Gouverneur are suffering.

It is to be noted at the outset that the topographical position of the village is such that storm water is rapidly drained from it through the several streamlets and ravines that empty into the river. Nature has provided ample means for the surface drainage of the

place. The saturation of the soil comes, as it does in Ogdensburg, from an abundant sub-soil or ground water, kept comparatively near the surface by the character of the underlying formation and doubtless flowing in general toward the Oswegatchie river, in whose valley both Gouverneur and Ogdensburg are situated. In addition to this the soil in the village is made the receptacle of all the sewage and filth of three thousand people. The sanitary difficulties of the village arise from the soil water and sewage, the sewage being the animal and vegetable waste produced in the town. To insure healthfulness the ground water must be lowered and the sewage removed from the place. There is but one method of lowering the ground water, and that is by artificial drainage of the sub-soil, and the only way to get rid of sewage is by building sewers.

The village, as I have stated, is fortunately so situated that it need make no provision for storm water in building sewers. *They should be made to carry sewage only.* A system of glazed-pipe sewers from six to eight inches in diameter will easily carry off all of the sewage of the place and deliver it at a proper outfall; but these sewers must be of the best glazed pipe, with joints as tight as can be made, and no storm water should be allowed to enter them, nor any sub-soil water; nor should they be connected in any way with the cellars. They should have automatic flush-tanks at all of the dead ends to secure a daily flushing and cleaning of the sewer pipes. In the trenches with the sewers should be laid agricultural drain tile, branches from which should be carried up to the houses and under the floors of the cellars. These drain tile, if properly laid, will reduce the level of the sub-soil water to the level of the drain. They should be laid at least six feet below the surface. The sub-soil drains should have no connection with the sewers. Their part is simply to carry off sub-soil waters and they may be given outlet into the ravines or brooklets which run through the village, or into the river. While laid in the same trenches with the sewer pipes, they need not be one continuous system, all flowing toward a common outlet, but may find outlet at any convenient point and pass off with the surface waters.

Accustomed as people are to large sewers and large pipes it is hard for those who are not familiar with the working of small-pipe sewers to realize how thoroughly they do their work and how great the sanitary advantages are of having pipes as small as possible.

Dr. Curtis called my attention to a proposed plan of arching over the brook which runs through the village and running lateral sewers into this as a main sewer. The project is to be *emphatically condemned on sanitary grounds* as well as economical. It will be a costly nuisance. Such a sewer must be built large enough to carry the flow of the brook in times of excessive flooding. It will, therefore, have to be perhaps fifty times larger than is necessary to carry the flow of the sewage alone; for usually the sewage of a population like that of Gouverneur can be discharged through an eight-inch pipe. In such a brook as that which runs through Gouverneur the

flow of water is small in summer and often insufficient to carry the solid matters that would come down from lateral sewers. Accumulations of solid matter would take place where the lateral sewers enter the brook, and these being covered from the sun and air would putrefy rapidly and sometimes cause offensive odors and always produce conditions dangerous to health and life. The sewer being built of rough stone, the cracks between the stones would become receptacles for filth when floods come and wash down the accumulations of solid sewage from the mouths of the lateral sewers. This plan of making a main sewer out of a brook has unfortunately been tried in many of our villages. I have examined a number of such structures and have always found them in an unsanitary condition. Nature has provided the brook to drain off the surface water falling upon its water-shed. So far as I can learn it is answering its purpose admirably and is clean and healthful. It is much better to leave it open to the purifying influence of the sun and air and keep the sewage out of it. Probably also the cost of the sewerage system which should include the arching over of this brook would be greater than that of a system finding its outfall through sewer pipe of the proper size. The first needs, therefore, of Gouverneur are to get rid of its sewage by a system of small-pipe sewers carrying sewage only, kept clean and wholesome by automatic flush-tanks, and to get rid of its excessive sub-soil water by bringing it to a level of at least six feet below the surface by a system of agricultural drain tile laid in the trenches with the sewers, with branches extending to the houses or under the cellars. Such a system of sewerage and drainage can now be carried out at a cost very much less than it could a few years ago. Richfield Springs and several other villages have constructed similar works during the past year, and Schenectady has laid nearly twelve miles of small-pipe sewers at a very moderate cost. The result of the carrying out of these recommendations at Gouverneur would be to free the village from accumulations of filth and dry the soil; but that would not render the well water safe to drink. Even with the best systems of sewerage and drainage where a locality becomes as thickly populated as Gouverneur it is impossible to prevent the constant contamination of the wells. A proper public water supply should, therefore, be provided for potable purposes. The present supply does not seem to have the confidence of the people, and it is not clear to me that it deserves it. The water is taken from the river about opposite the center of the village. For a quarter of a mile above the in-take the surface drainage of a populous region enters the stream, and then the principal cemetery is situated immediately upon the banks of the river. It is probable that the water supply of the village should be taken from the river at least one-half a mile further up. Whether or not the water of the Oswegatchie is a pure and wholesome water it would not be possible to determine without examination of that stream in time of low water as well as in the spring and autumn.

The brown color of the water excites a prejudice against it which

may be utterly unfounded on any sanitary grounds. The question as to the wholesomeness of the Oswegatchie as a drinking water could undoubtedly be determined by investigations carried through one season.

In view of all the conditions described, I, therefore, advise the committee to recommend to the citizens of Gouverneur the construction of a system of separate sewers and sub-soil drains for the removal of sub-soil water and sewage, the leaving open of the natural channels for the surface drainage of storm water, and the securing of a supply of potable water that shall be wholesome and command the confidence of the people. I recommend to the committee to advise the citizens that unless these measures are taken there is every probability of the continuance of an abnormally high death-rate from zymotic diseases, causing needless sacrifice of perhaps fifteen or twenty lives yearly.

Respectfully yours,

JAMES T. GARDINER,
Consulting Engineer.

In view of the statement of Dr. F. C. Curtis, sent by the State Board of Health to examine the sanitary condition of the village of Gouverneur, in the county of St. Lawrence, and the examination of its conditions, James T. Gardiner, consulting engineer of the Board, confirming the causes of the large and extraordinary mortality in the village, which causes are believed to be chiefly "soil saturation combined with filth under and around human dwellings," the use of unwholesome water, your committee recommend first of all the removal of the causes named in these reports. They ought to be and are within the present legal control of the authorities of the village. Particularized as they now are it becomes the duty of the citizens and the authorities to begin and complete the work of improvement herein specified. Proper drainage and sewerage are the first to be provided, and the health and comfort of 3,000 people depend upon providing both as speedily as possible. What ought to be done and the reasons for the kind of work recommended, and what ought not to be done and the reasons therefor, are fully set forth in the report of the consulting engineer. The death-rate it is believed may be reduced at least one-quarter by the timely and practical prevention of the diseases named which are causing so many deaths; the committee, therefore, hereby concur in the statement of Dr. Curtis as to the causes of mortality in the village of Gouverneur and in the recommendations of the consulting engineer, Mr. Gardiner, as to the needed drainage, sewerage and the supply of pure water.

ERASTUS BROOKS,
Chairman of the Committee on Drainage, Sewerage and Topography.

At a special meeting of the State Board of Health, on the 14th January, 1886, the report of the sanitary committee on Gouverneur was presented, and on motion it was received and its recommendations adopted.

ALFRED L. CARROLL, M. D.,
Secretary.

January 14, 1886.

SEWER NUISANCE AT ALBION, N. Y.

ALBION, N. Y., *June* 9, 1885.

To Dr. E. M. MOORE, *Rochester, N. Y., President of the State Board of Health:*

We, the undersigned, respectfully wish to call your attention to the outlet of the main sewers of this village. The waters at their mouths are conveyed for quite a distance through open and clogged ditches, emptying into a race, when they could be covered and run under said race into a creek with several feet more fall. They do not now have sufficient fall to carry off the sediment which collects at every shower along the whole line of sewers. Bottom of said sewers is covered with a nasty black slime, which is very offensive when exposed to the air. A good number of citizens, residing in the vicinity of these outlets, petitioned the local board of health to abate the nuisance. The health officer of the board pronounced it a nuisance and claimed it should be abated. He also claimed that this village is in a very unhealthy condition, with many cases of malarial fever and ague as the result of the bad sewerage of the village. He labored with the other members of the board for an abatement of the nuisance regardless of cost, but they ignored him entirely on the ground of dollars and cents.

We respectfully ask an inspection by your honorable Board. Would be pleased to have a member of your Board go over the ground, in company with our health officer, and see if something cannot be done for our relief before the warm weather begins. Please find inclosed stamp for reply to G. H. Ashby, who will cheerfully reply to any questions you may see fit to ask in regard to the matter.

(Signed), G. H. ASHBY,
R. E. HOWARD,
GEORGE W. KING,
W. T. DORRANCE,
WILLIAM CAMERON,
PETER McGOWAN.

Inclosed find petition, which was handed to local board.

REPORT OF ENGINEER.

To the Chairman of the Committee on Drainage, Sewerage and Topography:

SIR — In accordance with your instructions I have recently ex-

amined the conditions at Albion that have been the cause of complaint by certain residents, and herewith submit my report.

The village of Albion lies on both sides of the Erie canal, the main portion being on the southern side, the canal running nearly east at this place. The natural drainage of the country is to the northward, the slopes being very gentle, but in most places sufficient to secure good drainage.

All the sewerage of that portion of the village lying on the south side of the canal must necessarily discharge into it or be carried under it. The State has provided ample culverts for carrying the sewage and very much of the storm water under the canal.

There is a sewer running down Main street in a northerly direction, to the canal, passing under the latter and continuing as a roughly-built sewer of stone, for a distance of about one-half a mile beyond the canal. The sewer empties into a mill-race which flows along the south side of Caroline street for about 1,800 feet.

It is stated that the stone sewer on the north side of the canal was built by the State for its entire length, and that the owner of the mill-race preferred to have it discharge into the race, instead of passing under it and discharging into a branch of Sandy creek, about 200 feet distant and six feet below the race.

The nuisance complained of does not arise, or only in small part, from filthy discharges into the mill-race, but from the setting back of the water of the race up the sewer, and the flooding of cellars and low places.

There is undoubtedly a discharge of house drainage into the Main street sewer, but as there is no public water supply the solid matters of the sewage are for the most part deposited during the long passage through the primitive sewer, and the effluent is clear, unobjectionable to the sight, and without much odor.

The mill-race spoken of is supplied largely from waste water of the canal, and in dry times the adjacent creek receives almost its entire supply from the same source. The average amount of water flowing in the mill-race is nearly as great as that in the creek.

The mill-race is subject to daily fluctuations of level of six inches or more, besides more considerable changes of level, depending upon the season of the year. These fluctuations must have the effect of changing the level of the ground water in the immediate vicinity, and they are not improbably the cause of malaria in the adjoining houses, some twelve or fifteen in number.

SUGGESTIONS AS TO REMEDIES.

The sewer mentioned as a cause of complaint could easily be led under the mill-race into the creek, and as a temporary and inexpensive means of relief this would be a desirable improvement. The additional supply of water brought into the mill-race by the sewer is too small in amount to be of any value to the mill-owner.

The purchase of the milling privilege, which is of much less value than formerly, with the entire abandonment of the race, would be

a great sanitary improvement, and would at the same time enhance the value of property on the south side of Caroline street.

The entire village of Albion is much in need of a good system of sewers, for removing house waste and excrementary matters. No system can be recommended without careful surveys, and precautions must be taken to secure a proper outlet for any system adopted. Unpurified sewage discharged into the small brooks in the vicinity would undoubtedly occasion a nuisance.

It is not apparent that the State is in any manner responsible for the conditions that are the present cause of complaint. A temporary remedy is very simple, as pointed out, and is entirely within the powers of the village.

The more serious sanitary defects are the absence of proper sewers and the existence of the mill-race.

Very respectfully yours,

HORACE ANDREWS, *C. E.*

ALBANY, N. Y., *December* 9, 1885.

In accordance with the following report from Horace Andrews, civil engineer, employed by the State Board of Health to examine the mill-race and main sewer in the village of Albion, in answer to a petition laid before the Board at their meeting held in New York city, November 16, 1885, the committee present the following conclusions as the result of a careful examination of the evil complained of by citizens of Albion. The proper method and agencies to remove the evils named rests with the local authorities. In the judgment of your committee after the examinations now made, the State Board is not authorized to advise any other mode of relief than one wholly within the power and duty of the village authorities of Albion. The State is no way responsible for the conditions complained of.

ERASTUS BROOKS,

Chairman of the Committee on Sewerage, Drainage and Topography.

STATEN ISLAND, *December* 18, 1885.

REPORT ON THE SEWERAGE AND DRAINAGE OF MIDDLETOWN.

To the Committee on Drainage, Sewerage and Topography of the State Board of Health:

GENTLEMEN —A communication having been received from Hon. E. M. Madden on behalf of the citizens of Middletown requesting the State Board of Health to send an engineer to make a sanitary examination of that village and advise as to a general course of procedure with regard to sewerage and drainage, I proceeded to Middletown on the 19th inst., in accordance with instructions from the Board, and beg to make the following report:

TOPOGRAPHY.

The village of Middletown, having a population of some ten thousand people, is situated on a high rolling country, in Orange

county, with attractive surroundings and with a climate undoubtedly healthful. The village itself is sufficiently hilly to give diversity to its streets and to afford admirable natural opportunities for drainage. The small stream which flows through the lower part has several branches which afford good natural channels for surface drainage. The sidewalks of the village are in an unusually good condition, being flagged and having well-curbed and paved gutters. The attention which has been paid to the condition of the streets has secured excellent surface drainage throughout the village. The soil of a small district is gravelly but the greater part is clay, very hard and containing many boulders. This soil is to be found both in the flatter parts of the village and on some of the steeper hillsides. As I have said, the whole village, both in its lower parts and on its steeper hillsides, is admirably adapted to a complete and thorough system of drainage and sewerage. The obstacles to be overcome are unusually small.

Existing Sewers.

To overcome the difficulties which have arisen from the washing of the steeper streets in heavy rain, certain large storm-water sewers have been built and have effectually answered their purpose; but these sewers, in a small portion of the village which they cover, are also used for carrying away sewage. They, however, reach only a very few of the streets. I was unable to ascertain their total length; but they amount to a small fraction of the whole village. There appear to be some ten miles of streets in the village which either require sewers now or will at a very early day.

The present system of storm-water sewers empties into the creek which drains the surface of the village at a point below which there is a large population living close to the banks of the stream. I examined the condition of the stream and found that the bed both under the water and that part which is now dry is thickly coated with decomposing filth; it is in fact an open sewer.

Nuisances.

The condition of the main creek is in my judgment a nuisance endangering the health of the people who reside in the neighborhood of the stream, and the same may be said of the other branches of the creek which flow through the village. House drains are everywhere running into them and carrying not only house slops but human excrement; they are already fouled to such a degree that the smell from them is at times very strong. I think the condition of all these streams is such as to make them public nuisances, dangerous to the life and health of the people who live along them. But as there are no sewers through much of the town, and as cesspools are likely to fill and overflow when made in a hard-clay soil, it is almost impossible for the people to dispose of their house wastes in a sanitary manner.

The fault is not in the habits and desires of the people, for the

condition of the premises, even throughout the suburbs of the village, shows the desire of the people to keep their surroundings in as good a condition as possible. Were the streets of the village sewered, even in the suburbs, a very large proportion of the people would at once make connection with their houses.

SEWAGE DISPOSAL.

The stream which drains the surface of Middletown and runs from there several miles down to the Wallkill is so small that it will not be possible to make of it the outfall for the sewerage of Middletown, without a partial purification of the sewage before pouring it into the stream. If crude sewage is turned into the brook a nuisance will undoubtedly be created, the results of which cannot be foreseen. It will in my judgment be perfectly practicable to purify the sewage of the village in precipitation tanks for a reasonable sum, and turn the effluent into the creek without creating a nuisance. These works can be so arranged as to purify the sewage to any extent which experience may prove to be necessary under the circumstances. For two reasons it is specially important that the filth of Middletown should not go into the soil about the dwellings: first, that a very great proportion of the people during the summer season are using water from surface wells. The level of the water in these is seldom over five or six feet below the surface of the ground. They are, therefore, peculiarly liable to pollution. The city has a public water supply, but a great number of the people prefer well water on account of its coolness in summer and on account of the supposed difference in taste between it and the public water supply.

The use of surface wells is likely to speedily increase when proper sewers and drains are made through the village.

Another serious nuisance from polluting the soil is found in the fact that in the north and north-eastern part of the village the ground water rises to the floors of the cellars and very often enters them. If this ground water is seriously polluted, the air of the cellars is contaminated to a dangerous degree. Filth is bad for human health, and moisture is bad, but wet filth is one of the most dangerous conditions to which human life can be exposed.

The president of the village, Mr. J. N. Pronk, showed me through a large part of the village. We visited some premises where the ground water rises so high as to take into solution the contents of the privies. The people in this region were drinking water from surface wells, and had wet cellars. In fact, it seemed from the examination I made, and from the information I received from the president of the village, that from one-half to three-fourths of the inhabitants of the village are troubled with wet cellars.

Out of one hundred and sixty-three deaths which were reported to the State Board of Health from Middletown during the last ten months, twenty-five are from consumption. I cannot but believe that many of these deaths are due to the people living over saturated soils. Important as it is to provide for the removal of the filth of

Middletown, it is equally important to drain the sub-soil water down to a level which shall secure the dryness of all cellars; and this seems perfectly practicable. The death-rate of the village is moderate, doubtless owing to its salubrious situation; but many of the deaths which result from soil saturation or filth poisoning can doubtless be prevented, and the village made unusually healthful.

In general the wetness of the cellars, arising not from accumulations of storm water, but from a high level of the ground water and accumulations of filth in the soil, contaminating the soil water and the ground-air, and thus polluting the air of the cellars and the water of the wells, seem to be the principal insanitary conditions of the village.

In one or two places storm water is occasioning some inconvenience by washing the streets where the hillsides are unusually steep. The difficulty, however, can be remedied at a small cost. As regards the present sewers, they are not in proper sanitary condition. On opening a man-hole in the main sewer, in company with the president of the village, I found the stench from it intolerable, and he informed me that it had been cleaned out within the last six months. In a distance of perhaps a thousand feet some twenty car-loads of filth were taken out from this sewer. They were brought to the man-holes in a wheelbarrow and hoisted out. I regret to say that the man who did the work is reported to have died in consequence. I did not wonder after the examination made of this single man-hole.

It is perfectly possible to greatly improve the condition of these large sewers by devices for flushing and ventilation; and this should most certainly be done, as their present condition is dangerous to the public health.

As regards the manufacturing wastes which now, to some extent, pollute the stream, they would, of course, be easily provided for if there was any general system of sewerage through the village.

Plan for Sewerage and Drainage.

Recognizing the fact that the sewers which are already built will with very slight additions provide for the carrying off of storm water and surface drainage so as to prevent any danger to health or inconvenience from the washing of streets, the sanitary evils which are to be remedied in Middletown are two-fold; namely, the soil saturation, and the accumulations of filth.

There are three different methods of overcoming these difficulties; first, to expand the present system of combined sewers to take in the whole village. Second, to leave the existing sewers to take storm water alone, and to carry a separate system of small pipes for sewage only through the village, accompanied with a system of sub-soil drain tile to provide for the drainage of cellars and sub-soil. Third, to carry over the unsewered part of the village the separate system, and to utilize as part of it the sewers which have already been built, taking into the separate system the low-water flow of these sewers and excluding the heavy bodies of storm water which they carry in time of rain.

These plans will differ in cost and each has its own advantages and disadvantages. It is not possible to say without a careful survey what the relative cost and advantages will be ; but it would appear probable that the expansion of the combined system over the whole village would be far more expensive than the other two which have been named. The least costly would probably be the utilizing of what has already been done and the construction of the separate system through the unsewered part, making the plan, however, in such a way that if any street choose to lay down small pipe in place of the present large sewer, they could do so at their own option.

In my judgement the most satisfactory way for the citizens of Middletown would be to have surveys and estimates made for each of these plans, and a report setting forth their advantages and disadvantages. They could then determine which on the whole would be most satisfactory. As regards merely the sanitary side of the question, the investigations of the State Board of Health have shown that small sewers which can be constantly flushed by automatic means are very much easier to keep clean than large sewers, by which storm water is admitted. This is especially true in villages with unpaved streets, where the slopes are so steep that large amounts of gravel are washed into the sewers, making dams which hold back the sewage so that it putrifies and the sewers become merely prolonged cess-pools. This we find to be the condition of the large sewers in the village of Mt. Vernon, although they have a considerable slope, and it is doubtless the condition of the main sewer in Middletown, in the upper half of its course.

I do not mean to say that such a condition cannot be remedied ; but that the sewers which receive the wash of the streets in unpaved villages are far more difficult to keep clean than those which receive only house sewage and are so small that they can be thoroughly flushed every day without a large expenditure of water.

CONCLUSION.

I find that the people of Middletown are practically unanimous in their desire to have the village thoroughly sewered and drained, and the only question is, how it can best be done. Their experience has taught them that it would be far more economical for the property-owners if a definite plan is laid out, so that the assessment for sewer purposes on each property-owner can be determined once for all and the same property not be made to pay several times, on the theory that it was benefited by every sewer in its neighborhood, which has sometimes been the case, not only in Middletown, but in Albany, and every other city which is without a general system of sewerage.

My opinion is that a plan for the sewerage and drainage of Middletown could be devised which could be carried out as fast as the people desired for a total cost not to exceed $1.25 a running foot, which would be equivalent to an assessment of sixty-two and one-half cents a front foot on the property benefited. No piece of property should be assessed more than once. In view of the reason-

able cost at which the sanitary evils which threaten the health of Middletown can be relieved, and in view of the condition of public sentiment, which prompts immediate action in this direction, I recommend that a topographical survey of the village should be made, including such data as are necessary to be taken into consideration for the sewerage and drainage of the place, with plans of present sewers; and that based on these surveys three preliminary plans be made, one for the extension of the combined system over the whole village; another for carrying the separate system over the whole village; and the third for carrying the separate system over the unsewered part of the village, taking into it the ordinary flow of the existing sewers; and that a report be made, setting forth the cost and the relative economical and sanitary advantages of these different plans; that these be laid before the proper authorities of Middletown, and, when they have decided which shall be adopted, that a working plan of that system be made so detailed that the work of construction can proceed at any time when the village is prepared to undertake it.

Very respectfully,

JAMES T. GARDINER,
Consulting Engineer.

To Hon. E. M. MADDEN *and other citizens of Middletown, N. Y.:*

The undersigned committee, to whom the appllication for advice regarding the sewerage of Middletown was referred with power by the State Board of Health, at its meeting on June 15th, respectfully makes the following report:

A sanitary examination was made under our direction on the 29th of June by Mr. James T. Gardiner, formerly a member of the State Board of Health, and now its consulting engineer.

The facts reported by him show that the health of Middletown is threatened over a large part of the village by saturated soil producing wet cellars and by ground water and ground air becoming polluted with filth from cess-pools and privies.

This pollution of the ground water undoubtedly affects the health of the people by contaminating the wells and the ground air about the dwellings. This ground air is sucked into the cellars by the heat of the houses, and rises through the dwellings. Especially is this true during the winter months when the surface of the ground is frozen and the cellar windows closed. The filth pollution is also carried into the cellars by percolation of the ground water.

It further appears that the brooks which take the surface drainage of the village have been converted into open sewers and that they are in a condition not only offensive but dangerous to life and health. The soil saturation appears to be due not to accumulations of storm water but to actual sub-soil water.

The topography of the village seems to admit of a thorough system of drainage and sewerage. Exactly what plan would be best to adopt is somewhat complicated by the existence of a partial system of combined sewers already constructed.

While the experience of this Board is that the separate system has, in cases like that of Middletown, very decided sanitary advantages, it will doubtless be more satisfactory to your citizens to know the relative cost and advantages and disadvantages of the various means by which your insanitary condition may be relieved.

The Board, therefore, advises you that drainage and sewerage are necessary to your village, and the construction of a proper system will doubtless improve the public health and lower the death-rate, although this is not at present high.

We approve of the recommendation of Mr. Gardiner that you should have made a survey and preliminary plans from which to determine the relative cost and advantages of the different methods of drainage and sewerage; and having chosen the general method of procedure, you should have made a careful working plan upon which all sewers could be constructed. In selecting a plan for final adoption it is to be hoped that, since the work is for a sanitary purpose, the plan will be chosen which is of the greatest sanitary advantage, irrespective of any small difference of cost. The experience of the board in the villages of this State has been that the least expensive system was generally best from a sanitary point of view.

ERASTUS BROOKS,
Chairman of the Committee on Drainage and Sewerage.

SEWERAGE OF WARSAW.

WARSAW, N. Y., *May* 22, 1885.

To the State Board of Health:

GENTLEMEN — We believe that a due regard for the health of our villages requires us to invoke the aid of the State Board of Health, to assist us in arriving at a practical solution of the perplexing question before us:

First. What are the best and most available means of correcting or modifying the deleterious influence of certain ditches that have long since partially assumed the character of sewers.

Second. What is the most feasible and best plan for establishing a proper system of sewerage for this village? The village of Warsaw contains a population of over 2,000 inhabitants and is situated in a deep valley running nearly north and south. The water-shed on either side of the valley is quite extensive, and although most of the water is carried off by brooks leading down numerous ravines, still a large amount finds its way to the level of the valley, by soaking through the soil — in many instances flooding cellars and saturating the soil with a surplus of water.

A large part of the village is situated on the comparatively level ground in the valley, and numerous cellars are subjected to inundations every spring. There are many cellars which are never dry during the year, and at the present there is no opportunity to drain them. The principal cause of perplexity, however, is an open ditch which was constructed more than thirty years ago for the purpose

of carrying off surface water. It is located in the eastern part of the village, and runs diagonally across the slope of the hill. This ditch has gradually assumed the character of a sewer — in some instances sewerage from houses many rods distant being conducted to it, or directed toward low places that are eventually washed into it by rain storms. The current of the ditch is sluggish, and in the summer months the volume of water is small, sometimes ceasing to run and standing in small pools. In many instances, wells from which water is obtained for drinking purposes, also culinary uses, are situated within a few feet of it, and are *probably* more or less contaminated by it. Last summer several cases of fever (four we believe) occurred in families living near it, and our physician did not hesitate to attribute the cause to the condition of the ditch. The question naturally arises, why do not the local board of health condemn the ditch? *First.* There is no system of sewerage in the village to take the place of it. *Second.* There is no adequate sum of money available to make even a respectable beginning of such a system, unless it can be built for much less than any estimates that we have ever had. *Third.* If the people were compelled to make cess-pools the probability is that they would soon become as great a nuisance as the ditch. Last summer a public meeting was called to consider the question of sewerage and devise plans to abate the nuisance of this ditch or sewer. A committee was appointed to obtain estimates on the cost of building a main sewer. At an adjourned meeting they reported, but the estimates were so high that it was practically impossible to build it. We feel that we have no frivolous questions for your solution, and pray that you may send us a competent person to solve the question which we feel needs more experience and ability than we can command.

Very respectfully yours,

A. B. BISHOP, *President*,
L. L. CHAFFEE,
W. J. SERVICE,
FRANK WILSON,
CHAS. J. GARDNER,
J. W. KNAPP,
Town Board of Health.
J. W. H. SHIPLER,
Town Clerk.
D. E. MATTISON, M. D.,
Health Officer.

We unite with the local board of health in praying that their request may be granted.

J. P. RANDALL, *President*,
M. D. CHACE,
Z. Y. LUSK,
A. T. GAGE,
WM. BRISTOL,
Village Trustees.

ENGINEER'S REPORT.

Hon. ERASTUS BROOKS, *Chairman of the Committee on Drainage, Sewerage and Topography:*

DEAR SIR — I have examined into the conditions that prevail in the village of Warsaw, the county seat of Wyoming county, in response to a petition from the town board of health and the village trustees, made on the 22d of May last, to the State Board of Health, and which was referred to me for investigation.

I have the honor to submit the following report:

SITUATION OF WARSAW.

The village of Warsaw, containing about 2,000 inhabitants, is situated upon Oatka creek, which runs at this place in a northerly direction. The sides of the valley, through which the creek flows, rise somewhat abruptly to a height of 200 feet or more. At the place where the village is situated the valley is nearly level for a width of about one-quarter of a mile on each side of Oatka creek; a short distance north of the village the level portion of the valley increases in width.

The main street of the village runs in a direction almost exactly north and south, and is a short distance east of Oatka creek, which it crosses, however, in the southern part of the village.

The principal portion of the village lies to the east of the creek, though quite a large number of residences are on its west side.

There are six or seven streets crossing Main street at right angles and running eastward up the hillside until an abrupt slope is reached, these streets also extend to the west as far as the creek, and one of them crosses it by means of a stone bridge, and passes up the steep westerly slope of the valley to the station of the Erie railway. There are also several streets on each side of the creek, running in a direction parallel to that of Main street.

The Erie railway, running along the hillside on the west, and the Rochester and Pittsburgh railway, on the east side of the valley, are both at a considerable elevation above Oatka creek. For convenience of railway transportation the numerous salt wells, which have been sunk during the past few years, are situated high above the bottom of the valley. The wells are of great depth, as much as 1,600 feet in one instance. Some 200 feet of boring would have been saved if railroad facilities had been found near the bottom of the valley.

SURFACE DRAINAGE.

In many places the water from rains and melting snows has worn deep ravines in the hillsides. The quantity of water flowing in some of these ravines is, at times, very considerable. To prevent a similar erosion in the lateral streets running east from Main street a ditch, now known as the "Corporation ditch," was dug many years ago. This ditch, throughout a part of its course, runs parallel to Main street

and about 300 or 400 yards east of it, afterward it turns to the west, crossing Main street, and finally enters Oatka creek.

The "Corporation ditch" removes a large amount of surface water, and the ditches at the sides of the street suffice for the removal of the remainder, though they would probably perform their functions better in many places if they were kept free from grass, which grows in them to a large extent.

SUB-SOIL WATER.

On the west side of the valley there is much shale, lying in nearly horizontal strata, while lower down the hillsides there is considerable gravel. On the east side of the creek the soil is very generally of a gravelly nature, and there are indications that the bed of the creek has been at some previous time in a different position from its present one. In the more level parts of the village, water is met with at a depth of from five to twelve feet; on Main street it is generally found at a depth of eight feet. In many places the cellars are permanently wet, and are in a suitable condition to occasion sickness.

Striking proof of the great permeability of the sub-soil is met with in the western part of the village, where the waste water from one of the salt wells flows down a ravine, impregnating some of the wells in the vicinity with salt. One of the wells was examined by me and a sample of the water was obtained. This well was sixty feet from the water-course at its nearest point; but no water was flowing through the channel, which was quite dry in places for a long distance above the well. The water from the well in question seems rather more saline to the taste than ordinary sea water.

There is every reason to believe that the soil in the eastern part of the village is quite as porous as in the western portion, though there are no salt wells directly east of the village whose waste waters can permeate the sub-soil.

HOUSE DRAINAGE AND FILTH DISPOSAL.

Most of the houses are provided with privies of the ordinary and faulty construction. No effort is made to secure water-tight vaults or receptacles for excrementary matters. Along the course of the "Corporation ditch" many privies are built within a few feet of its banks; the ditch is said to be in general use for the drainage of sinks, etc.

There are in many places deposits of filth along the bed of the ditch; at some points the ditch is nearly dry from soakage and evaporation, while at others the flow from springs is received and the water becomes clearer. A sample of water obtained near the mouth of the ditch does not appear much more objectionable, as far as clearness is concerned, than that taken from a well which was shown me by the health officer.

A good water supply, taken from springs at a considerable eleva-

tion above the village, has been distributed throughout the thickly-settled portion of the village for several years.

The larger number of families are said to use well water in preference to that furnished by the water company, either because it is cooler and may be considered pleasanter to the taste, with carelessness, as regards danger of filth contamination, or because the well water can be more cheaply obtained than that furnished by the company.

Unsanitary Conditions.

There can be no question but that much of the liquid matter from house drainage finds its way into the wells. Water-closets are not in very general use at present, though they are constantly being introduced, and the water carriage of excrementary matters may in time increase the pollution of the wells.

The inhabitants of Warsaw have a practical illustration of the dangers of filth contamination in the salt impregnated wells in the western part of the village. Most of the wells in the village are more favorably situated for receiving sewage pollution than those wells whose taste betrays the presence of salt are for receiving the waste waters of the salt works.

It should be remembered that clearness of color and pleasantness of taste are no proofs that water is not receiving the drainage from privies and filthy ditches.

Since it is improbable that the use of well water for drinking purposes will be entirely abandoned for many years, the vaults of all privies should be made small and perfectly water-tight, or, if these are still to be in general use, enlightened public opinion should compel the use of water-tight tubs or pails, to be removed under village authority every few days.

Village Sewers.

At various times the advisability of constructing a system of sewers has been discussed, and surveys have been made to ascertain the grades that would be required. It has been found that a sewer could be laid in Main street, running to the north, and finally turning to the west and discharging into Oatka creek, while laterals can easily be laid in the streets running east from Main street. The estimated cost of this system of sewers was so large that no action has been taken regarding their construction. The plan suggested was only adapted to the needs of a portion of the village, and the removal of all waste waters, including surface water, sub-soil water and house drainage, was contemplated.

Very recently a number of citizens have, by the consent of the village authorities, constructed a private sewer, of large sized vitrified pipe, running through private property and discharging into the tail-race of a mill near the creek. About twenty-five water-closets are now said to be connected with this small sewer.

The construction of private sewers, forming no part of a well-de-

vised plan, is certainly a very objectionable proceeding, and the needless encroachment upon private property is to be deplored.

As a means of disposal of house drainage, a system of sewers of moderate cost would appear to meet the necessities of the case much better than the use of tubs or water-tight privy vaults. If the sub-soil water could, at the same time, be lowered sufficiently to dry the cellars, the sewers would undoubtedly give a great deal of satisfaction to all who would share in their benefits.

SUGGESTIONS REGARDING SEWERAGE.

It is earnestly to be hoped that no more sewers will be constructed until a carefully considered plan of sewerage for the whole village has been adopted.

For economical reasons and on sanitary grounds it is to be recommended that the system adopted shall be the "separate system," for house drainage, only the sub-soil water to be removed by tile drains laid in the sewer trenches and up to the cellars of adjoining houses.

It is exceedingly desirable that the sewers should be confined to the streets, and be laid through private land only where it is absolutely necessary to do so.

The contemplated outlet for the village sewage is Oatka creek, which already receives a quantity of it.

This creek flows northerly and empties into the Genesee river, about ten miles south of Rochester, after a course of thirty-three miles from Warsaw. The nearest village below Warsaw is Wyoming, about six and a half miles distant. Le Roy, the most important village below Warsaw, is nineteen miles distant, as the creek flows. The creek is said not to be used for drinking purposes at any point of its course; notwithstanding this fact, it is not an outlet for raw sewage that can be recommended. The creek has a small flow in dry seasons, and its waters would then be badly polluted if the sewers were discharged into it. In devising a system of sewers the gradients should be so chosen, if possible, that the sewage may, whenever desirable, be purified by some approved method, without the necessity of pumping. After purification, the sewage could enter the creek without occasioning a nuisance and with much less danger to those below Warsaw who might drink the water. The advisability of some treatment of the sewage, before it can be discharged into potable water, is an additional and very strong argument for excluding surface and sub-soil water from the sewers.

Two main sewers would appear to be needed, one on each side of the creek. One of these sewers could extend along Main street and would suffice for the drainage of all buildings on that street and those east of it. The details of such a plan of sewerage can only be ascertained by careful instrumental surveys. A rough estimate of the cost of the Main street system would be as follows:

3,200 feet of fifteen-inch vitrified pipe, laid	$4,000 00
8,000 feet of six-inch vitrified pipe, laid	2,400 00
6 flushing tanks	380 00
12 man-holes	360 00
19,600 rods of three-inch drain-tiles	4,000 00
Engineering and contingencies	1,200 00
Total	$12,340 00

The necessary four-inch pipes for house drains, with lateral drain-tiles and Y connections at the sewers, will probably cost $25 for each house connection. The entire plan should be devised by a competent engineer, and carried out with the greatest precautions to insure faithful work.

Leaving out of account the expense of purifying the sewage, it does not appear that the cost of the Main street system, which would benefit the greater part of the village, should exceed $12,500.

NECESSITY OF CONSTANT SUPERVISION.

Unless well constructed, any system of sewers is sure to prove a nuisance, and without constant care and supervision, after completion the sewers will very imperfectly fulfill their purpose.

An inspector of sewers should be appointed to examine into the working condition of the flushing tanks, the preservation of the pipes, man-holes and outlets, and to grant permits for house connections. It should also be his duty to see that such house connections are properly made and that no surface or sub-soil water is admitted to the sewers.

The Corporation ditch should be kept clean and so improved as to remove storm water in an effective manner. Even with the largest sewers, surface water occasionally accumulates in objectionable quantities. It does not appear that any thing more than temporary inconvenience is ever occasioned at Warsaw from accumulations of surface water. It is, therefore, in the true interest of economy, as well as in that of health, that a liberal expenditure should be made for securing a system of sewers for house drainage only, and for always maintaining it in perfect order, rather than to attempt the construction of large sewers, which are apt to prove a serious nuisance on many accounts, in a village of moderate size.

The powers of the local board of health should certainly be exercised to prevent the contamination of the sub-soil water by refuse and excrementary matters. Rigorous ordinances must be adopted and strictly enforced without delay, before the sanitary condition of the village can be considered above reproach.

Very respectfully yours,

HORACE ANDREWS, JR.

ALBANY; *June* 8, 1885.

ALBANY, *June* 25, 1885.

To the Board of Health and Board of Trustees of Warsaw, N. Y.:

GENTLEMEN — From your statement to this Board on the 22d of May last, it appears that the citizens of your village have been alive to the dangers which arise from accumulations of filth in a thickly inhabited district, and have undertaken to secure plans for a system of sewerage for the village. The plans made hitherto, and presented for the approval of the citizens, however, have been so costly that they could not be carried out. It seems that your citizens are not willing to abandon the hope of properly draining the village, and your appeal to the State Board of Health for aid and advice is based upon the expectation that it may be able to suggest some practicable scheme for securing the necessary relief.

In view of these facts, Mr. Horace Andrews, Jr., an engineer of the Board, was sent to make an inspection and report as to the necessity for the sewers and the practicability of their construction at a moderate cost. A copy of his report is herewith transmitted, from which it appears that there is urgent necessity for the sewerage of the village of Warsaw. The conditions which he describes are sufficient to prove that fact.

It further appears that a system of separate sewers, large enough to carry sewage only, could probably be built for a cost not to exceed $12,500. Such a system of sewers would probably relieve the village of the principal sanitary evils which now threaten it. That small sewers, such as he describes, and properly arranged with flush-tanks are thoroughly efficient in removing sewage, has been amply demonstrated by the experience of other places. If the system is properly planned by an engineer, and thoroughly understood, it will undoubtedly be successful.

As regards the question of outfall it would appear that the sewage should be more or less purified before being allowed to flow into Oatka creek. Plans for precipitation tanks should be made at the same time as the plans for the sewerage system.

On behalf of the Board,

ERASTUS BROOKS,

Chairman of Committee on Drainage, Sewerage and Topography.

REPORT ON THE DISPOSAL OF THE SEWAGE OF WARSAW.

To the Committee on Drainage, Sewerage and Topography :

GENTLEMEN — In accordance with your instructions I visited Warsaw and Wyoming on the 16th and 17th of September, to see whether it would be desirable for the people of the village of Warsaw to construct a system of sewers emptying into Oatka creek, and whether such disposal of the sewage would create a nuisance endangering the health of the people living on the stream below Warsaw, or in any way injure the water for the uses to which it is now put.

From the paper submitted to me by the committee I learned that

the town board of health of the town of Wyoming had protested against the action of the State Board of Health, in recommending that the village of Warsaw construct a system of sewers which should enter into Oatka creek after a proper purification of the sewage.

It appears that they fear that if the sewage of Warsaw should enter Oatka creek, the contaminated water of the stream might by percolation reach the water of the wells in Wyoming, and that the water of the stream would be unwholesome for cattle to drink; also that it would be so contaminated as not to be available for use in the salt wells. They further fear that owing to the sluggish character of the stream there would in places be deposited organic matter, the decay of which would pollute both the air and the water. In company with the president of the village, I first examined Warsaw to acquaint myself with the necessity of sewerage in that place. The conditions have been already described in the report to the Board by Mr. Horace Andrews. He in nowise exaggerates the necessity for relief from the evils which arise from the present methods of filth disposal. Much of the soil of the village is clayey, in which the ground water stands so high as to readily take in solution the filth from privies and cess-pools, and much of that which is thrown upon the surface. Damp and even wet cellars are common through many streets.

Pollution of the ground water of the village and the entrance of this contaminated water into the cellars is doubtless an insanitary condition. The open ditches which are described by Mr. Andrews are polluted and at times offensive; but I think the prevalence of wet cellars, wet with polluted ground water, is even a more serious and widespread evil than these open ditches, although the latter appeal more directly to the senses of the people.

The introduction of a water supply to the village is steadily increasing the difficulties of disposing of polluted waters. There is no remedy for these insanitary conditions excepting a system of sewers and sub-soil drainage. The difficulties that arise from storm water are few and can easily be obviated by surface ditches and gutters. Sewage and sub-soil water are the causes of the existing evils. They can only be disposed of properly by sewers and drains.

There is but one possible outfall for the sewage of the village, and that is Oatka creek, which runs through the center of the place. Several sewers and polluted ditches now empty into this stream. Although the stream is evidently a small one, in times of drought it is still large enough to carry off the fluid part of the sewage of Warsaw, provided the fluid and solid constituents of the sewage are properly separated. The fluid part might contain sufficient putrescible matter to pollute the creek in times of low water, provided it was not properly purified before admission into the stream. It seems to me evident that sewerage is necessary to protect the lives and health of the two to three thousand people living in Warsaw, and that Oatka creek is the only outfall for the sewage. I, therefore, examined the creek between Warsaw and the village of

Wyoming, six miles below, to see whether the use of the creek as an outfall for the sewage of Warsaw was likely to create a nuisance along the stream. The distance by the road between Warsaw and Wyoming is six miles, while by the windings of the creek it is probably at least twelve. The central part of the valley in which the stream flows is so low and flat, and the soil so moist, that it is almost entirely used as pasture. The farm-houses stand back from one-third to one-half a mile from the center of the valley on the slopes at the foot of the hills which rise several hundred feet above the valley. The wells from which drinking water is taken are of course near the houses.

The village of Wyoming, which is situated at the foot of the hills, is some distance from the stream. One mill and two or three houses are, however, in the center of the valley, opposite the village of Wyoming. From the topographical structure of this locality; from my observation of similar valleys in western New York; and from facts which I learned regarding the flow of the sub-soil waters in the neighborhood of Warsaw, I feel sure that the flow of the ground water which supplies the wells is from the hills toward the center of the valley; and that, perhaps with the exception of one or two houses in the neighborhood of the village of Wyoming, there can be no possibility of the water of the stream percolating into the wells. The only wells which might be in any way affected are some twelve miles below Warsaw as the stream runs. Whether or not these wells would receive by percolation any water from the stream is very doubtful.

In continuing my journey down the valley I saw no places on the stream below Warsaw where the drinking water of the people would be injured by the use of Oatka creek for the sewage disposal of Warsaw.

As regards the use of the water of this creek in salt wells I found that several wells were pumping water from the creek, from which wells it was again discharged as saturated brine. The evaporation of this brine produces salt. Should any of the morbific germs be contained in the water that is used they would undoubtedly be destroyed by the heat at which the brine is kept during the process of evaporation. There is, therefore, no probability that the water of Oatka creek would be injured for use in the salt wells by the admission of the purified sewage of Warsaw into the stream.

As regards the effect on the health of cattle drinking the water of this stream, I can find no case reported either in Europe or in this country where the drinking water very slightly contaminated has proved injurious to the health of cattle.

Should the water of a creek be grossly polluted with crude sewage and its banks defiled with deposits from such sewage, it seems not improbable that the health of cattle might be injured by drinking it. Purified sewage is turned into many of the small streams of England from which cows are allowed to drink, and I can find no case of harm resulting. The danger to cattle, therefore, seems re-

mote and improbable provided that the contamination of the water is very slight. In this case the matter seems to depend upon the *amount* of the contamination, which will be very small if the sewage is properly purified, but which might be a serious matter to property owners of Wyoming, if Warsaw should neglect to properly purify the sewage. Assuming then that the sewage of Warsaw be properly purified before being turned into Oatka creek I am of the opinion that it should be allowed on the ground that it is required to protect and preserve the health of several thousand people, while against such method of sewage disposal it can only be said that there are remote possibilities of injury to cattle. Undoubtedly the laws should protect the health of the people of Wyoming by enabling them to insure the proper planning and maintenance of sewage purification works at Warsaw. If these works are properly planned and maintained there will in my judgment be no injury to the public health in the town of Wyoming. I visited the village of Wyoming, and in an interview with the health officer and one of the most active members of the board of health I explained my views in regard to this matter and the desire of the State Board of Health to protect the health of the people of Wyoming, while at the same time recommending what appears to be a necessary measure for insuring the health of Warsaw. These gentlemen seemed to accept the conclusion that harm to the health of Wyoming was improbable, provided thorough sewage purification was maintained at Warsaw. Their fear is that, however well planned the purification works may be, they will eventually be improperly maintained and the creek thereby become foul.

Should Warsaw desire to construct a system of sewerage an act for that purpose would have to pass the Legislature; provided that the present laws would not secure to the people of Wyoming the efficient maintenance by Warsaw of their purification works, a law should be passed affording the necessary redress to the people injured by any such neglect.

Very respectfully yours,

JAMES T. GARDINER,

Consulting Engineer.

REPORT OF THE COMMITTEE ON DRAINAGE, SEWERAGE AND TOPOGRAPHY ON THE DISPOSAL OF THE SEWAGE OF WARSAW.

The State Board of Health, having heretofore examined the village of Warsaw, with reference to the necessity of a system of sewerage for that village, and having recommended the construction of a system of sewers and sub-soil drains, having outfall into Oatka creek, after proper purification of the sewage, and that report having been published in the papers of Warsaw, a remonstrance was received from the town board of health of Middlebury, which lies below Warsaw in the valley of Oatka creek. The local board requested a

further examination of Oatka creek below Warsaw, and set forth certain dangers which they feared threatened the public health of Wyoming should the recommendations of the State Board of Health to Warsaw be carried out.

In response to this appeal Consulting Engineer James T. Gardiner was sent to examine the whole question and make such recommendations as the facts of the case might warrant. His report, herewith appended, is approved by the committee. It appears that the rapidly growing village of Warsaw, containing a population of between two and three thousand people, is suffering for want of a proper system of sewerage and sub-soil drainage, and that there is no other outfall for the drainage of Warsaw than Oatka creek. This creek is not used for a potable water supply below Warsaw, nor is there any house in the immediate neighborhood of the stream until it has flowed some twelve miles. The stream is used only for watering cattle and for supplying water to the salt wells. It appears that in the process of evaporating the brine from salt wells, the temperature is raised so high as to kill all morbific germs. As regards the effect of very slight pollution of water on the health of the cattle drinking it, the committee is not aware of any facts to prove that injurious effects have been suffered, although purified sewage in England is discharged into many streams which flow through pastures.

While there are remote possibilities of such injury, they should not, in our judgment, weigh against the positive and known evils which threaten the health of several thousand people in Warsaw. It is, however, important that the pollution of the water should be slight, and this can only be by a careful maintenance of properly-planned works for the purification of the sewage.

Proper legal provision should undoubtedly be made for protecting the rights of the people below Warsaw by insuring the thorough purification of the sewage of Warsaw at all times. We, therefore, recommend that the Board declare that, in their judgment, a system of sewerage and sub-soil drainage is necessary for the village of Warsaw, the sewage to be discharged into Oatka creek so purified as to cause no injury to the health or property of the people on the creek below.

ERASTUS BROOKS,
GEORGE W. COOK, M. D.,
EDWARD M. MOORE, M. D., *President*,
ALFRED L. CARROLL, M. D., *Secretary*,
Committee.

At a meeting of the State Board of Health on the 24th of September, at Albany, the above report was presented, and on motion was adopted by the Board, its recommendations approved and a copy ordered transmitted to the authorities of Warsaw and Wyoming.

ALFRED L. CARROLL, M. D.,
Secretary.

REPORT ON THE DRAINAGE OF THE NEW COURT-HOUSE AT LOCKPORT.

To the Committee on Drainage, Sewerage and Topography:

GENTLEMEN — In accordance with your instructions I visited Lockport on the 20th of July last, to examine into the question of the best method of disposing of the drainage of the new court-house. I found that the greater part of the city of Lockport is without any proper system of sewerage. Short sewers have been built on certain streets generally by private parties, which find outlet into the canal. They often end above water line, as the canal is in a cut where it passes through the western part of the city. The mouths of some of these sewers open close to the bridge on the main business streets and so near to blocks of stores that the offensive odors from the sewers or from some of them are said to be very noticeable. This is not at all unlikely, for the sewers themselves are generally so constructed that much of the fluid matter leaches out of them, leaving the solids deposited in the sewers there to putrefy and grossly contaminate the air.

The parties who live near the open sewer mouths are justly alarmed at this state of things, and the local board of health has forbidden any more sewage from being drained into some of these sewers. The only practicable outlet that I could find for the sewage of the court-house was into one of the existing sewer outlets and thence into the canal, but the city authorities have forbidden the county from using the only available sewer outlet and require them to build one of their own which shall enter the canal below water line.

On the other hand the Superintendent of Public Works has given notice that no sewer or foul-water drain of any kind shall be permitted to discharge into the canal, and that those already existing will be cut off. The county appears, therefore, unable to drain the new court-house. The Superintendent of Public Works will not allow them to build a new outlet into the canal, and the city will not allow them to use the only old one which appears to be available. The discharge of the sewage of the city of Lockport into the canal is certainly very objectionable. Not only is the air polluted by the emanations from the mouths of these sewers, but the water of the canal itself is made so foul as to be objectionable on sanitary grounds both to Lockport and to the towns below. The people of Lockport have felt greatly aggrieved that the city of Buffalo was allowed to pollute the water of the canal and in public meetings strong resolutions have been passed regarding this matter. Buffalo has now gone to great expense to build an intercepting sewer and thus prevent the contamination of the Erie canal water. The city of Lockport should remember that the people who live along the canal below them have the same right to object to their fouling the waters with the sewage of Lockport.

The pollution of the canal water by foul emanations not only endangers people living along its banks and on the canal boats, but

after careful inquiry I find that it is not at all uncommon for the boatmen to drink the canal water, and it is of course used by them for ordinary domestic purposes.

A very large number of people are, therefore, exposed to any insanitary influence arising from the waters of the Erie canal. Thousands live along its banks or on its surface during the active season and hundreds use the water for domestic purposes, while many doubtless drink of it. For these reasons it is clear that the use of the canal as an outlet for sewage should not be allowed.

The city of Lockport should construct a carefully-planned system of sewers discharging not into the canal but into Eighteen-mile creek. I examined the ground and found such a system entirely practicable, at least so far as a large part of the city is concerned. The present sewers might be used simply for carrying off storm water from the streets, and the new system be confined to sewage and sub-soil water, unless it be also necessary to provide for their carrying the overflow of cisterns.

It appears that Lockport is largely supplied with drinking water from cisterns situated in the cellars of houses for which proper overflow must be provided. As I have not made a detailed examination it would be impossible to advise at present as to the best method of providing for the overflow of these cisterns; but in general it can be said that a system of small pipe sewers provided with flush-tanks would answer all the requirements of the case.

Objection has been made to giving outfall to the sewage of the city into Eighteen-mile creek. I examined the ground and can see no other practicable outlet for the fluids of the sewage. It appears clear that a nuisance would be created if the crude sewage should be turned into this stream. It will, therefore, be necessary in my judgment to purify the sewage before it is allowed to flow into the creek. As it will undoubtedly be some time before public opinion will be so instructed and aroused regarding the necessity of a sewerage system in Lockport, some temporary means must be provided for the drainage of the court-house. The sewer through which the sewage of the old court-house is at present discharged is not only improperly built but it is not at a proper level to drain the new county buildings. A new sewer must, therefore, be laid, whatever may be the point at which it finds outlet. It would be a measure of proper economy if this sewer should be of such dimensions and grade as to form a part of a general city sewerage system when such a system should be constructed. In consideration of the county building a sewer which would in every way be adapted to city use along the streets in which it was laid, the city might consent to the county sewer finding temporary outlet through one of the existing city sewer mouths, since no new sewer mouth can be constructed.

I, therefore, recommend that merely as a temporary expedient the county be allowed to use the most available outlet through one of the city sewers; but with a distinct understanding on the part of the city that it is a merely temporary arrangement. I informed the city

authorities and the city surveyor of my views in this matter. I do not consider this disposal of the court-house sewage a good one on sanitary grounds; but only recommend it as the best available one until proper sewers are built by the city.

Very respectfully,

JAMES T. GARDINER,
Consulting Engineer.

REPORT OF THE COMMITTEE.

The board of health of the city of Lockport having appealed to the State Board in the matter of the sewerage of the new county building situated in the city of Lockport, Consulting Engineer James T. Gardiner was instructed to examine the premises and report such recommendations as seemed best under the circumstances.

His report, hereto appended, is approved by this committee; and in accordance with his suggestions we recommend: That as a temporary expedient the new county building be allowed to find outlet for its sewage into the most available of the existing sewers.

We do not consider this a desirable permanent arrangement, but simply the best possible under the circumstances, and until a proper system of sewerage is provided for this part of the city of Lockport.

We condemn the pollution of the Erie canal with the sewage of Lockport as liable to injure the health of the people living along its banks, both in Lockport and below, as well as the health of the boatmen and their families who live on the canal.

We earnestly recommend the city of Lockport to construct a proper system of sewerage as soon as possible, so arranged with regard to outfall as to create no nuisance to the people living on the stream, which seems to be the natural outlet for the drainage of the city.

ERASTUS BROOKS,
Chairman.

At a meeting of the State Board of Health on September 24th, at Albany the above report was presented, and on motion was adopted by the Board, its recommendations approved, and a copy ordered transmitted to the county and city authorities of Lockport.

REPORT UPON NUISANCE CAUSED BY AN OPEN SEWER AT COHOES.

To the Committee on Drainage, Sewerage and Topography, of the State Board of Health:

GENTLEMEN — There exists in the central part of the city of Cohoes a sewer that is said to have been formerly a natural water-course; in more recent times this has been owned by the Cohoes Water Power Co., who used it for removing a large volume of surplus and waste water.

The Water Power Co. has at various times deeded away most

of the property along the water-course, reserving the right to discharge their waste water into the stream. At many places large arches have been built over the water-course, buildings have also been erected close to its banks, and directly over it also, for a distance of about 1,200 feet. At places, however, the stream is uncovered, and also where it empties at the tail-race of the Anchor hosiery mill on Mohawk street.

Gradually the various residents along the course of the stream have turned their house drainage into it and have built privies immediately over it in many places. The city also has a sewer, receiving the surface drainage from several streets and the sewage from a number of houses, which empties into the water-course.

Owing to the great volume of waste water constantly allowed to flow in the stream by the Cohoes Water Power Co., the sewage was entirely unnoticeable until within a year or two, when the company by constructing new flumes has abandoned the stream in question as an overflow, still permitting a small but rapid stream to flow in the wide bed of the former torrent. Now the sewage has become a decided nuisance, causing powerful and disgusting odors; moreover all kinds of refuse and garbage are thrown on the bank of the stream, where it is uncovered. The condition of the stream is such that it is an evident nuisance, especially to those whose occupations cause them to spend much of their time near the mouth of the stream and along its uncovered parts.

SUGGESTIONS FOR RELIEF.

The portion of the city traversed by the stream in question is very imperfectly sewered, the difficulties being that solid rock is everywhere met with and that whole streets are taken up by the flumes of the Water Power Co., which are arched over and themselves become the receptacles of sewage from the city sewers. At some future time proper sewers may be constructed in all the streets and a suitable outfall may be secured by means of a tunnel, as has been proposed. For the present, however, it is hardly possible that relief can be secured from the particular nuisance that is the subject of this report, by any expensive system of sewers. The most practicable plan would appear to be the construction of a sewer of moderate size along the entire length of the wide bed of the water-course. This sewer can have an invert of solid rock for nearly its whole length, about 1,200 feet, and would need to be large enough to receive the storm water and sewage.

The Cohoes Water Power Co. should also withdraw their restrictions as far as may be necessary, to allow of this small sewer being built, and should pledge themselves to continue, as at present, the discharge of a small but constant volume of water into the sewer.

The wide bed of the creek should then be filled with clean and suitable material.

No privies should be allowed on the arch of the sewer, and all

connections of every description, including the street catch-basins, should be trapped.

It is believed that the plan here proposed would be a great sanitary improvement upon the existing conditions, and that it can be carried out at small expense; while possessing features, not altogether desirable, on sanitary grounds, it will nevertheless give much needed relief from a nuisance of considerable magnitude. Whenever a definite plan for the sewerage of that part of the city shall have been carried out and a proper outfall secured, all sewers, including the one mentioned, that pass under buildings and through private property should be abandoned and filled up.

Very respectfully yours,

HORACE ANDREWS, JR.,
Civil Engineer.

ALBANY, *August* 6, 1885.

REPORT

OF THE

SEWERAGE OF MT. VERNON.

To the State Board of Health:

On the 21st day of April the State Board of Health was directed by the Governor to examine and report as to the existence of a nuisance in the town of East Chester, alleged to be caused by the discharge of the sewage of the village of Mt. Vernon into a small brook. The matter was referred to the committee on drainage, sewerage and topography, who took immediate action.

Although this committee had previously investigated and reported on this nuisance, it was considered best to make a second inspection through another engineer, the first examination and report having been made by Horace Andrews, Jr., C. E. In accordance with instructions, O. S. Wilson, C. E., proceeded, on the 23d of April, to Mt. Vernon and made an examination. His report is herewith given in Appendix marked B; Mr. Andrews' previous report, together with the first report of the committee, is given as Appendix marked A.

REPORT.

For a description of the conditions, we would refer to appendices A and B. Mr. Andrews' observations as to the existence of a nuisance are fully sustained by Mr. Wilson. There can be no doubt that the discharge of the sewers of the village of Mt. Vernon into the small brook, therein described, is a nuisance which is likely at times to be of serious magnitude.

By direction of the chairman of the committee, Mr. Wilson took samples of the water from the head of the brook where it enters the sewer, above the village of Mt. Vernon, and, also, samples of the outflow of the sewer. Although these were taken at three o'clock in

the afternoon, when the water would be least contaminated, and although there had been no rain for a number of days, so that little street drainage was emptying into the sewers, the effluent was found to be so grossly polluted as to be clearly within the term "sewage." This is proved by the chemical analysis of Prof. Willis G. Tucker, and the chemical and microscopical examination of Prof. William H. Hailes, made at the request of the committee. The samples examined by Prof. Hailes and Prof. Tucker were not identical. No analysis was made of the water at the head of the sewer, as it was evidently very pure compared with the effluent.

It will be seen from Mr. Wilson's report that the village has strict ordinances concerning the admission of sewage into the sewers, the theory being that they are intended for the drainage of streets and subsoil water alone. Whatever may be the theory, the fact is that sewage is flowing from this sewer into the brook, creating a dangerous nuisance. Mr. Wilson's observations, as to the condition of Mt. Vernon, show that a complete sewerage system is very much needed for the village itself.

Mr. Wilson fully approves of the remedy of a small intercepting sewer, suggested by Mr. Andrews in his report and previously approved by this committee and by the Board. The work of laying this sewer, if undertaken at once, could be finished in time to give the village the benefit of it before the hot weather. The building of this intercepting sewer would relieve the creek from the nuisance complained of. It would not only do this, but would also greatly benefit the village of Mt. Vernon, by giving it a permanent outlet for a complete system of sewers, a thing very much needed.

Recommendations. In view of these facts, this committee again recommends the Board to declare the condition of the brook, into which the sewers of the village of Mt. Vernon flow, to be a nuisance, dangerous to life and detrimental to health; and that the Board advise it to be abated, as speedily as possible, substantially as set forth in the report of Mr. Andrews, given in Appendix A.

Committee on Drainage, Sewerage and Topography.

JAMES T. GARDINER, *Chairman.*
ERASTUS BROOKS,
GEORGE W. COOKE, M. D.,
EDWARD M. MOORE, M. D., *President.*
ALFRED L. CARROLL, M. D., *Secretary.*

The above report of the committee on drainage, sewerage and topography in reference to Mt. Vernon, together with its recommendations, are hereby approved by the Board and ordered to be transmitted to the Governor, as the conclusions and recommendations of the State Board of Health.

ALFRED L. CARROLL,
Secretary.

A

REPORT

ON THE

SEWERAGE OF MT. VERNON.

To the State Board of Health:

Early in December a petition was received from a large number of the principal citizens of the Village of Mt. Vernon, Westchester county, stating that a small but living stream, running through a part of the village, is made to receive a filthy discharge from sewers which extend through some of the principal streets, and that the stream is thus rendered a foul smelling and unwholesome open sewer, the stench of which is said to be, under some conditions, perceptible at a distance of two or three thousand feet from the stream. The petitioners state that this state of things has existed for several years, and that repeated appeals to the village trustees and the local board of health have been ignored. Last year, it is said, the conditions were made worse by extending the sewers within the village, thus increasing the volume of filth with which the water-course is polluted. The petitioners add, that failing to find relief from the local authorities, they are compelled to ask that the State Board of Health intervene in their behalf.

This petition and the names of the citizens signing it are herewith appended.

As soon as possible after the receipt of this petition, about the middle of December, Mr. Horace Andrews, civil engineer, in the employ of the Board, was sent to examine into the existence of the alleged nuisance, and also into its causes and the best remedy

therefor. The sewer complained of is the outlet of a small system of sewers built ostensibly for carrying storm water and spring water only, and there are severe village ordinances against the draining into these sewers of any excremental matter. In spite of these facts, the water made foul in human dwellings, and the foul street washings come through these sewers in such quantities as to be readily observed at the outfall, although it was not demonstrated to Mr. Andrews' satisfaction that human excrement was passing through the sewer. The amount of filth however which is collected by these sewers from other sources is so great as to dangerously pollute the water of the creek, and to cause deposits of organic matter in its channel which in a state of decomposition undoubtedly endangers the health of the people.

This opinion of Mr. Andrews is corroborated by the statements of two succeeding health officers of the village, and by the testimony of a large number of influential citizens. The fact that a large amount of foul organic matter is deposited by this sewer in and along the channel of the stream is beyond question, and that this material is so great in quantity that its decay causes a serious nuisance. This committee therefore recommends that the State Board of Health declare the conditions herein described a nuisance dangerous to life and detrimental to health.

The committee have considered the recommendations of Mr. Andrews respecting the best remedy for the evil. It appears that the village of Mt. Vernon is just introducing a system of public water supply, and that there are no sewers in the village intended to carry off sewage, but that cess-pools and privies are used throughout the town. The dangers from cess-pools and privies have been so clearly set forth to the people of the State, that they need not here be dwelt upon; but whatever danger there may be in the use of cess-pools before a public water supply is available, the introduction of water, leading, as it does, to the use of three or four times as much per capita, as is consumed when wells and cisterns are the only sources of supply, introduces a new element of danger. There being no sewers, all the water fouled by use in water-closets, baths, and sinks, must find outlet into the soil, which thus becomes saturated with polluted water. Most serious epidemics often follow the introduction of an ample water supply into towns where cess-pools have been for many years in use, and which have provided no sewers to carry off the waste water. It is therefore most important for the public health of Mt. Vernon, that a system of sewerage should be at

once constructed to carry off the sewage of the village. The present sewers are available and useful only for storm water and no sewage should be admitted to them. We therefore advise that the separate system of sewers, consisting of small glazed pipe flushed with automatic flush tanks should be adopted and built at the earliest possible moment by the village of Mt. Vernon. As the construction of the sewers may take some time, we recommend that the out-fall sewer of this system be constructed first in accordance with the plan proposed by Mr. Andrews, and that this out-fall sewer, which would be made of twelve-inch glazed pipe, be used as an intercepting sewer for taking the low-water flow from the system of rain water sewers in accordance with the plans.

By an ingenious device, which is described by Mr. Andrews, the twelve-inch pipe of the separate system can be made to carry not only the low-water flow from the storm-water sewers, but also the first part of the flow in times of storm, which is often very foul on account of the street washings which come down into these sewers.

This admirable plan, suggested by Mr. Andrews, will in the opinion of the committee completely relieve the Mt. Vernon brook from pollution, either by sewage from dwellings or by foul matter washed in from the streets in times of rain.

The out-fall sewer recommended is to extend from Mt. Vernon to Hutchinson's creek, a distance of from eight to ten thousand feet. The sewage passing along this pipe will empty into Hutchinson's creek, just above the point reached by salt water. The absence of dwellings from the neighborhood of this creek, and the amount of water flowing in it, render it improbable that any nuisance will be created by the sewage emptied into it. Still it is possible that at some future time the region between Hutchinson's creek and the Sound might become inhabited, and the condition of the channel of Hutchinson's creek become a nuisance. In this case it would be necessary for the village of Mt. Vernon to purify or partially purify its sewage before allowing it to pass into the creek.

It is therefore desirable to make provision for this in the beginning by selecting a place in the line of the out-fall sewer, where small precipitation tanks can be easily constructed. Small tanks for the precipitation of sewage by means of chemicals need cause no nuisance to the neighborhood in which they are situated; and yet it would be better to have them at some distance from the localities that are to be thickly settled.

Wherever these tanks are erected, an abrupt drop of a few feet will be required in the line of the sewer, and it is desirable in selecting the grades for a sewer, that this should be taken into account in the beginning, and the grade so arranged that precipitation tanks can be erected whenever required.

The out-fall sewer extending from the mouth of the present sewer to Hutchinson's creek should be built as early in the spring as possible, and the channel of the village brook cleared out before the hot weather.

As regards the cost of this out-fall sewer, which in the beginning will act as an intercepting sewer for the sewers now built, I may say that a twelve-inch pipe is now being laid in Schenectady, six feet under ground, for forty-five cents a lineal foot, including all costs for excavation, pipe, material and labor.

The man-holes on the sewers are costing $30 each. There would need to be perhaps ten man-holes between Mt. Vernon and Hutchinson's creek. Mr. Andrews has estimated the cost of this intercepting or out-fall sewer at $6,500, which allows for a higher cost per lineal foot than that paid at Schenectady.

Recommendations. This committee therefore recommends that the Board declare the condition of the brook into which Mt. Vernon sewers empty is a nuisance, dangerous to life and detrimental to health, and that the Board advise that it be abated at the earliest possible time, substantially set forth as in the plan of Mr. Andrews herewith appended.

Committee on Drainage, Sewerage and Topography.

JAMES T. GARDINER,
Chairman.
ERASTUS BROOKS,
GEORGE W. COOKE, M. D.,
EDWARD M. MOORE, M. D.,
President.
ALFRED L. CARROLL, M. D.,
Secretary.

At the quarterly meeting of the State Board of Health, February 17th, the above report was submitted, and on motion approved and ordered transmitted to the trustees of the village and the local board of health of Mt. Vernon, as the conclusions of the Board.

ALFRED L. CARROLL,
Secretary.

APPENDIX.

PETITION.

The undersigned, living in and near Mt. Vernon, a village of several thousand inhabitants in Westchester county, ask your attention to a grave sanitary abuse from which many people here have long been suffering. It is of the following nature:

A small but living stream, running through a part of the village, is made to receive the filthy discharges from a sewer which extends through some of the principal streets of the place. The stream is thus rendered foul-smelling, and otherwise disgusting and unhealthy — an open sewer, in fact, during the whole year — and is especially abominable during the warm, dry weather of summer. Those living along its course, both within and outside the village, for a distance of 2,000 or 3,000 feet, are seriously annoyed by the stench arising from it, and the health of many has been injured by its influence.

This state of things has existed for several years. Repeated appeals to the village trustees and the local board of health concerning it have been ignored; and last year the condition of things was made worse by extending the sewers within the village, thus increasing the volume of filth with which the water-course is polluted.

We are the victims of corporate indifference and ignorant stupidity, and having no hope of relief at home, we are compelled to ask that State authority interfere in our behalf.

Christian Von Hesse,	James D. Irwin,
Emily Von Hesse,	Saml. Bernstein,
Mary MacKaye,	Thomas Thorn,
Edward H. Betts,	Wm. L. Marcy,
S. S. Pevear,	G. G. Wagner,
W. J. Youmans,	J. Frank Hull,
B. Franklin Bernstein,	Chas. M. Moseman,

Wm. A. Miles,
Robert Taylor, M. D.,
Geo. S. Miller,
R. D. Watson,
E. A. Youmans,
Edward L. Youmans,
W. R. Austin,
Geo. W. Woosler,
S. L. Close,
A. M. Campbell,
Hiram J. Collins,
H. J. Badenhauser,
B. Hufnagel,
Edw. S. E. Phipps,
W. Koch,
Alfred Cooley,
Charles J. Chatfield,
Wm. Blake,
J. A. Brown,
Robt. Marks,
Peter Sheridan,
Michel Powers,
Patrick Fraley,
John Le Page,
Gustav Schindler,
N. A. Lawlor,
A. E. Crowley,
Joseph Gagg,
William Kortlang,
John Kapp,
George W. Kapp,
Valentin Hinkelbein.

REPORT UPON A NUISANCE AT MOUNT VERNON, WESTCHESTER COUNTY.

James T. Gardiner, Esq., *Chairman of Committee on Drainage, Sewerage and Topography:*

Sir — According to your instructions I have examined into the causes of complaint regarding a nuisance at Mount Vernon, and herewith submit my report.

General Description of the Village of Mount Vernon.

The village of Mount Vernon is less than fourteen miles by rail from the Grand Central Railroad Depot in New York, and a large number of its inhabitants carry on business in the city. Owing to the ease of access of Mount Vernon its growth has been very rapid of late, the census of 1880 indicating an increase of seventy per cent over the enumeration of 1870. The entire number of inhabitants was 4,586, according to the last census.

The village is somewhat scattering, as there is a tendency toward ownerships of one or two acres or more, but there is a solidly built portion of the village containing at present perhaps as many as 3,000 inhabitants.

In estimating future growth of the village it is safe to predict that the most important increase in numbers will be in the solidly built portion, although the village may become spread over a still larger area than at present, and a considerable growth be evident by an increase in the number of villas and detached houses in the outskirts.

The land upon which the village is situated consists of a number of low hills, of clay in places, and elsewhere of deep beds of gravel. Near the railroad station the land is quite level, and a peat swamp covers several acres.

The streets of the more compactly built portion of the village slope to the north and north-west, the natural drainage being into a small brook which is a branch of Hutchinson's creek.

SEWERAGE OF THE VILLAGE.

About twelve years ago sewers were built in some of the streets for the purpose of readily removing the storm water and that from springs. It was feared by some that these sewers might be used for house drainage, thus causing the effluent to become a nuisance. An injunction was therefore obtained restraining all persons from discharging house waste into the sewers.

At different times the sewers have been extended until they are now about as represented upon the map of the village accompanying the petition.

The main sewer, extending along Fourth avenue, is of brick, oval in cross section and having a greatest internal diameter of about three feet. The sewers along Third and Fifth avenues, which join the main sewer near the railroad station, are of fifteen or eighteen inch vitrified pipe. The Fifth avenue sewer carries the water from springs in the upper part of the village.

The main sewer discharges about 700 or 800 feet north west of the railroad station, the effluent passing along the borders of the peat swamp already mentioned and being considerably augmented by water draining from the west. The course of the small brook thus formed is indicated upon the accompanying map; it flows about a mile and a half from the mouth of the sewer before reaching Hutchinson's creek, the latter soon afterward becoming mixed with the salt water of Long Island sound.

NUISANCE CAUSED BY EFFLUENT FROM SEWERS.

Although, as stated, an injunction restrains the inhabitants from discharging house drains into the sewers, still there have been complaints for the last four or five years as to the foul nature of water discharged from the sewers. It is very evident that rain water flowing from the streets must carry a considerable amount of filth into the sewers, especially where the inhabitants pour waste water into the streets and gutters to a considerable extent. It is also believed by some that neither the liability to fine from a transgression of the law, nor care for the comfort of those residing near the sewer outlet has proved a sufficient motive to prevent some of the residents from discharging their house drainage directly into the sewers.

However filth may get into the sewers, there is no doubt but that it does so, and that the small brook receiving the discharge has been converted from a stream of pure and sweet water into a dirty and vile-smelling open sewer. The health officer, in his last report, says: "The open sewer through the swamp north of the depot cannot but be a source of disease with favorable atmospheric conditions." In June, 1881, the health officer remarks in his report: "It is a question whether great damage has not resulted to many households having connections with the sewers, who, abiding under the delusion that they were only used for water drainage from cellars and the like, have failed to provide proper traps and other safeguards against the invasion of sewer gases into their houses." During the same summer the nuisance arising from accumulations of filth and from offensive waters issuing from the sewers became so great that the health officer presented to the local board of health a remonstrance, signed by a number of citizens of the village, asking for relief. In presenting this remonstrance the health officer, Dr B. J. Burnett, concludes by saying: "Steps looking to the relief of the individuals who are the complainants must soon be taken by the health department of this village to avoid the interposition of the State Board of Health."

At the time of my visit, Monday, December 15, 1884, a heavy rain had occurred within twelve hours, which must have washed out the sewer and have removed surface filth from the streets. It might be supposed that the effluent water would be very nearly clean therefore. The spring water which can be seen near Third street before it passes into the sewer was quite clear and devoid of smell. At the mouth of the sewer, however, there was a very perceptible smell, while the water was much discolored and filled with ropy masses apparently formed by the mixture of soap and hard water. There was no room for doubt that large quantities of soapy water were flowing from the sewer, but whether this came from house-drains or from the emptying of wash tubs into gutters leading to the sewers, is difficult to decide.

In summer time the flow from the springs is quite small and the effluent from the sewer is commonly reported to be very offensive, at such times excrementary matters are said to be frequently visible in the sewer water, and the filthy nature of the muddy deposits along the banks of the brook confirms this statement.

It therefore appears that notwithstanding preventive laws and

complaints from residents of the village for a number of years, the sewers do now receive a large amount of house sewage; that the outlet is so placed that a naturally pure water-course has been defiled and rendered an intolerable nuisance and that repeated appeals to the local authorities have been entirely unavailing in affording relief to those residing along the course of the contaminated brook and to those who may innocently imagine that the sewers are only legitimately used, and hence neglect to provide traps in their cellar drains.

Unsanitary Methods of Filth Disposal and Dangers to be Apprehended in Future.

Throughout the village of Mt. Vernon the generally adopted manner of disposing of house waste, and the only legal one available, consists in the use of the ordinary cess-pool and privy vault. Up to the present time there has been no public water supply and those who unfortunately live in the more densely settled part of the village must have been compelled to use wells more or less contaminated by the leachings from their own and neighbors' cess-pools.

The health officer in a recent report to the Board of Trustees states that: "Within an area bounded by First and Second streets and Third and Sixth avenues, there is not a well from which it is safe to use water. The soil in a large part of this territory is sewage-soaked to saturation."

An artesian well has recently been sunk in the higher part of the village, and at the time of my visit water-pipes were being laid, by which those residing along the course of the sewers, as well as many others, will doubtless soon receive a supply of water very much to be preferred to that furnished by the wells.

When the new water supply comes into use the cess-pools, which are even now inadequate, will soon cease to contain the extra amount of water which will be poured into them. If the ground is now "sewage soaked to saturation" it will be an absolute necessity to provide some proper means of sewage disposal as soon as an abundant water supply comes into use.

Proposed Remedies.

There would seem to be no practicable means of remedy for the evils that have been the subject of complaint in the present petition except an effective system of sewerage. It is very doubtful if the nuisance complained of is of so dangerous a nature to the inhabit-

Hutchinson's Creek
SALT WATER
8000 FEET
N
S
NHRA
OPEN SEWER
Chester Hill
Mount Vernon
3rd. Ave.
4th. Ave.
SEWER
5th. Ave.
4th. Ave.
Central M.U.V.

ants of Mt. Vernon as the complete saturation of their soil with filth from their drains. Already this latter evil is of appalling magnitude and no action can be too quickly taken to abate it.

Plans of sewerage of very great and indefinite expense have been made, and it is doubtless owing to the apparent magnitude of the undertaking that the inhabitants have for so long time suffered their health to be imperiled and the good name of their village to be brought in question.

The portion of the village that most needs sewerage is all situated on one drainage area and there is no reason why a system cannot be devised for it at once, leaving other portions of the village, which are but sparsely settled, until future needs may require other systems for them also. Without an abundant water supply it would have been useless to consider any means of sewerage, since the modern sewer is intended for the removal of household waste by means of water, but now that there is reason to believe that a liberal supply will be available there is no excuse for deferring action.

In Mount Vernon the present sewers remove the storm-water in an expeditious manner and seem to answer the purpose of their construction. The question to be considered is whether the present sewers can be so extended and otherwise improved as to remove house-waste and the ordinary sewage of the village, or whether it will be better from sanitary or economical reasons to adopt a separate system of sewers for removing sewage proper, allowing the present storm-water sewers to remain, and compelling the inhabitants of the village to use them for their legitimate purpose only.

If the present sewers are to be used for the reception of house-waste it will be necessary to provide some other outlet than the present one and the only one that would appear to be at all practicable would be by means of an extension of the main sewer to the point where Hutchinson's creek meets the salt water. By discharging the sewage, at this point, where the volume of water in the creek is considerable, the sewage would probably occasion no trouble until the village had grown to a much larger size than at present.

The objections to this extension of the main sewer would be that the cost of laying this large main a distance of from 8,000 to 10,000 feet would be very great and in dry weather the flow through it would be quite small, so that a very large extent of surface within the sewer would remain covered with filth, emitting noxious vapors to the annoyance and detriment of health of the village. If the village should further commit itself to the use of large sewers, hav-

ing the combined objects of the removal of storm-water and house drainage, the system will become a heavy burden to the community for frequent extensions will be called for to remove house-waste in places where there will be no trouble from storm-water for many years.

THE SEPARATE SYSTEM OF SEWERAGE.

To properly remove sewage from the village there would seem no other alternatives than to build an outlet sewer of considerable length or to discharge the sewage into settling tanks where it could be disinfected if necessary and the sludge, precipitated by chemicals, could be removed while the clarified effluent could flow off as at present. In either of these plans it would be desirable to exclude storm-water from the sewers, in order that in the first plan the diminished size of pipe may reduce the cost to a minimum, and in the second, the sewage may be as little diluted as possible.

It has been proposed that the sewage should be removed by allowing it to flow on suitably prepared land in the neighborhood of Pelhamville, but this plan appears wholly unsuitable for the case under consideration, since land is everywhere held at a high price, and there would be loud remonstrances against converting any land adjoining possible villa sites into a "sewage farm."

About one acre would be needed for every one hundred persons in the sewage farm suggested; from twenty-five to thirty acres would therefore be needed at present, which, with the necessary expense of preparing the land, would make this a very costly plan.

Although at some places the expense of operating sewage farms has been partially borne by the increased amount of crops, still, as far as past experience can be taken as a criterion, sewage can neither be utilized as a manure nor purified by intermittent filtration without considerable expense.

Where the principal value of land is that which it possesses as a site for residences, almost any other sanitary method of sewage disposal should be preferred to that of irrigation.

Taking all facts into consideration, it would seem to be the best as well as the cheapest plan to lay a twelve-inch pipe approximately along the course of the small brook, whose contamination is now the cause of complaint, until the sewage can be discharged into Hutchinson's creek at or near the point to which the tide rises. If the growth of the village should in future be so great that a perceptible nuisance would be caused by the discharge of the sewage

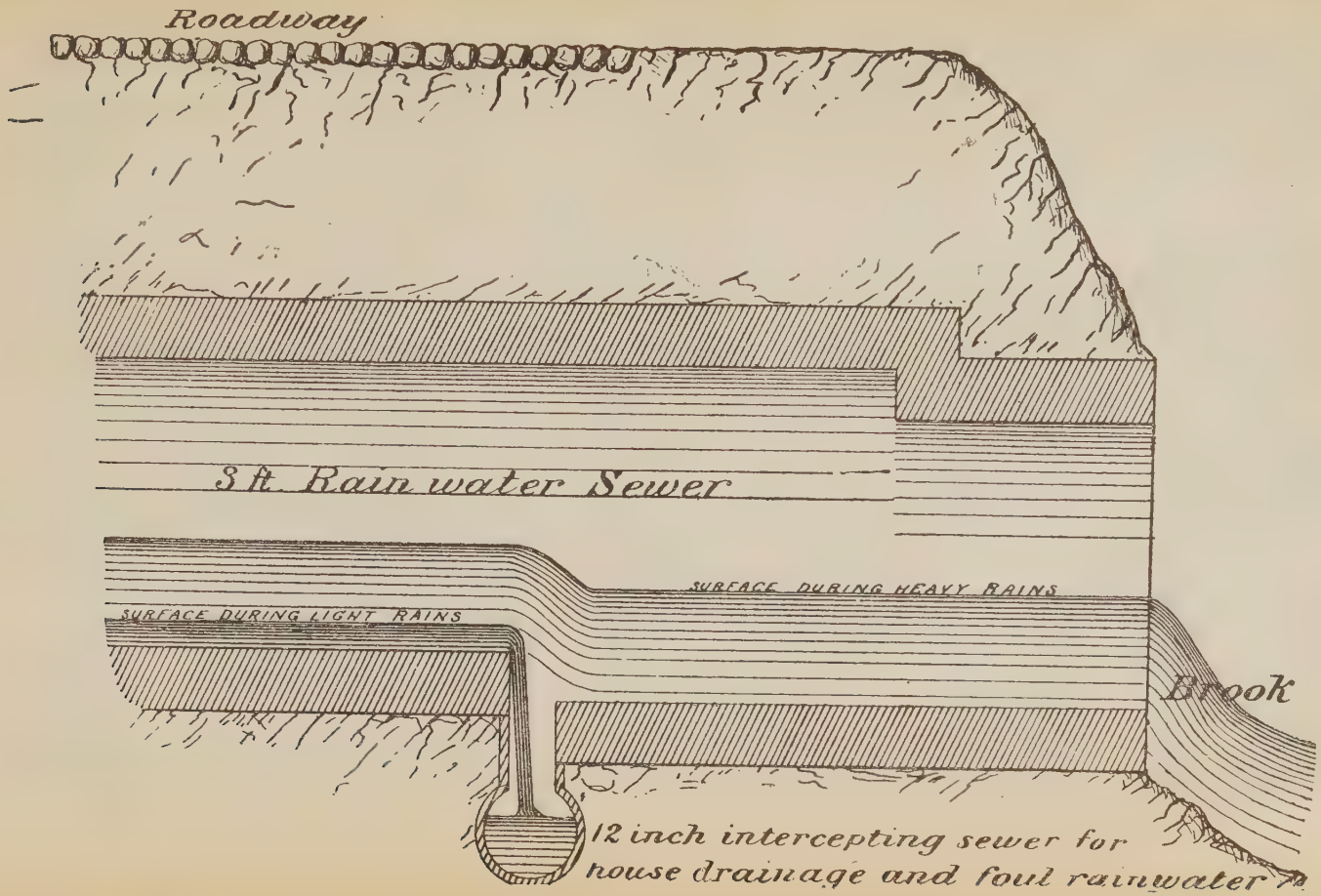
in the manner indicated, it could then be brought into tanks and precipitated and deodorized. Six or eight-inch lateral pipes would be needed in the main streets of the village with flushing tanks at their ends while the present sewers would remain to drain off the storm-water and to dry the subsoil as they now do.

It is not necessary to describe the separate system of sewerage in detail, as its main features are well known; it would seem to be peculiarly applicable to Mt. Vernon, as there does not appear to be any way to escape the use of an outlet pipe of considerable length, and the smaller the size of this pipe the less costly would the sewage removal be. The separate sewerage system has besides, many points to recommend it in a village like Mt. Vernon. From a sanitary point of view the small, well flushed pipes of the separate system would be much preferable to the large sewers of the combined system, which would in general carry only a very shallow stream of water and would emit disagreeable and unhealthful odors from which the separate system is nearly free.

The cost of the separate system would undoubtedly be much less than that of any other that could be devised, the principal expense being for the long outlet pipe. Careful surveys are needed before the actual length of outlet pipe required can be definitely known, but it would be cheaper to use such an outlet than to attempt to precipitate the solid matters of the sewage. The precipitation of sewage would require careful attention by some one instructed in the requirements of the case. Probably a number of years will elapse, before Mt. Vernon is of such a size as to render its sewage precipitation necessary for the health of those living near the mouth of Hutchinson creek.

A rough estimate of the expense involved in laying a twelve-inch pipe from 8,000 to 10,000 feet in length, with the necessary manholes would be $6,500, while the duplication of the existing sewers by six-inch pipes, together with ten manholes and three flushing tanks, would amount to about $7,000 more. Future extensions of the sewers would involve less outlay than would be possible with any other system.

The entire abandonment of cess-pools and privies in the thickly settled portions of the village is certainly called for, as they are now saturating and polluting the subsoil and poisoning the air in the houses. Strict ordinances are needed relating to cess-pools and privy vaults, not only for the preservation of health of those residing in the central portion of the village, but also for improving the sani-


Roadway
3 ft. Rain water Sewer
SURFACE DURING HEAVY RAINS
SURFACE DURING LIGHT RAINS
Brook
12 inch intercepting sewer for
house drainage and foul rainwater

tary condition of those parts which may be without sewerage for a number of years to come, and where wells may still be in use after the introduction of the new water supply.

Temporary Expedients.

If the separate system of sewerage should be adopted at Mt. Vernon, it would be possible to obtain relief from the nuisance that is the occasion of the present petition by merely constructing the long outlet pipe, which would remove contaminated water to a point where it would occasion no trouble. Afterward the laterals, flushing-tanks, etc., could be added as occasion requires.

This temporary plan would call for the admission into the new outlet pipe of the ordinary dry weather flow from the present sewers, and also the first flow from the streets during a rain. The nearly clean water flowing out of the sewers, when the rain fall became heavy, could pass into the brook as at present. Even with the completed separate system of sewers, the first flow from the streets during a rain storm might well be admitted into the small outlet pipe, since the first water flowing from the streets, at the commencement of a rain, will be very nearly as impure as any other sewage.

The device that could be used to secure the admission of the dry weather flow from the present sewers, until the laterals are built, and the first part of any rain fall, would be a very simple one, as indicated in the annexed diagram.

At the point where the sewers cross, an opening is made in the bed of the rain-fall sewer and also in the crown of the intercepting sewer. Knowing the inclination of the rain-water sewer, the size of the openings can be adjusted and the steps in the large sewer fixed so that any given amount of rain water may be taken into the twelve-inch sewer.

The amount that should be received into the small sewer will depend upon the pitch of the latter and its consequent capacity. During a heavy down-fall of rain, the velocity of the flow in the large sewer will be so great that none or very little will enter the twelve-inch sewer.

In very dry weather it is estimated that only three-tenths to four-tenths gallons per second flow through the present sewer, while a few days after heavy rains the quantity was only six gallons per second, or 50.4 cubic feet per minute. A twelve-inch sewer with an inclination of only one in five hundred would carry twice the latter amount.

By the arrangement described, all contaminated waters would be excluded from the brook, and it would cease to be a nuisance to the residents of Mt. Vernon, while the outlet could for many years to come be used for the sewage of all that portion of the village that will need provision for its disposal, after the necessary laterals are provided.

Very respectfully,
HORACE ANDREWS, JR., C. E.

ALBANY, *January* 31, 1885.

B.

JAMES T. GARDINER, Esq., *Chairman of Committee on Sewerage, Drainage and Topography of the New York State Board of Health:*

SIR — In accordance with your instructions, I visited Mount Vernon April 23, and submit the following report on the sanitary condition of the village as I found it, and inclose various extracts of the village ordinances; an extract from the report of the present health officer, Dr. E. F. Brush, dated December 16, 1884, a plan for sewering the village made by S. Towle, C. E., in 1882, and an opinion on the same by J. W. Adams, C. E., 1883, the two latter containing statements pertinent to the present report. Horace Andrews, Jr., C. E., made a report to your honorable committee on the same complaint in January last, which I fully indorse and will only supplement as to the present condition of the village requires.

WATER SUPPLY.

Until this spring the source of water for drinking and culinary purposes has been from ordinary wells, which is always a dangerous source in any village. A water company has recently been organized and has put down an artesian well 500 feet deep near the corner of Third street and Seventh avenue. A water main has been laid from the well through Third street to Fourth avenue, thence along Fourth avenue to the New Haven railroad. About three-fourths of the residences along this route are using the water and others have applied for connections. Water mains will be laid in other streets this season. The water seems pure and is soft enough for laundry purposes.

SANITARY CONDITION OF THE VILLAGE.

Were a person ever so skeptical as to the desirability of having a supply of good water and a system of sewers in a village of 3,000 inhabitants living on a small area, an inspection of this otherwise beautiful village would convince him that they are not only desirable, but really necessary to the enjoyment of life and health. The village authorities have passed certain sanitary ordinances and regulations

which are creditable to them, some of which are given below. They seem to be ignored by many of the inhabitants, and their violation overlooked by the authorities.

[Extracts from the Sanitary regulations of the Board of Health of the village of Mt. Vernon.]

ORDINANCES.

AN ORDINANCE IN RELATION TO THE REMOVAL OF NUISANCES.

The Trustees of the Village of Mount Vernon do ordain as follows:

It shall be the duty of any person, owner or occupant on whose premises any nuisance may be found, to remove or abate the same. And any such person or persons who shall fail to remove or abate such nuisance forthwith on receiving notice from the president of the village or a committee from this board, shall be subject to a fine or penalty of five dollars, together with the cost of removal or abatement when done by this board.

Approved September 14, 1875.

AN ORDINANCE IN RELATION TO CONNECTION WITH DRAINS.

SECTION 1. No connections or openings shall be made with any pipe, brick or stone drain or sewer, without permission first having been obtained from the board of trustees, or from such officers of the village as may hereafter be empowered to grant permits therefor.

§ 4. No person having been granted a permit to connect with any drain, shall fill in around the same until it has been inspected, and the connection approved by such person as the trustees may appoint for the purpose.

§ 5. All drains from houses or lots shall have a suitable and proper trap at a point inside the line of such houses or lots.

§ 9. No permit shall be granted authorizing the use of any drain for sewage purposes, nor shall any drain be used for such purposes.

§ 10. All persons, owners and workmen violating either of the provisions of this ordinance shall be liable to a penalty of twenty-five dollars.

Approved November 29, 1875.

PUBLIC REGULATIONS.

At a meeting of the board of health of the village of Mount Vernon, held on Tuesday evening, February 14, 1882, the following sanitary ordinances, regulations and orders were unanimously adopted, viz.:

CHAPTER II.

OBEDIENCE TO ORDINANCES.

SECTION 1. That the health officer, under direction of this board, is empowered to make and shall make the necessary inspections and examinations, and shall have power to enforce compliance with the orders, regulations and ordinances of the health department, whenever necessary; and that said health officer shall act summarily when the public health so demands it. That the police officers shall execute all orders of this board and the health officer, whenever so required; and all persons are forbidden to interfere with or obstruct such inspection, examination and execution that the said health officer or police officers shall undertake to perform in obedience to the order of this department, said interference being a direct violation of law and punishable therefor.

§ 4. No person shall impair or imperil the purity or wholesomeness of any water used for drinking or culinary purposes in the village of Mount Vernon.

SECTION 1. That no owner, lessee or keeper of any tenement or boarding-house or factory shall allow the existence of any nuisance or any thing injurious to the inmates thereof, detrimental or dangerous to the public health and safety. All sewers or drains that pass within fifty feet of any source of water used for drinking or culinary purposes shall be water tight. Any violation of this section shall subject the offender to a penalty of twenty-five dollars.

§ 2. That no privy-vault or cess-pool shall hereafter be constructed within the limits of Mount Vernon unless the side walls and bottom of the same are of brick or stone, laid water tight in good cement, nor shall they be within thirty-five feet, or, where practicable, within fifty feet of any well, spring or other source of water, used for drinking or culinary purposes, or within three feet of the line dividing the property of respective owners; and no privy-vault now existing or hereafter to be built shall be allowed at less than fifty feet distant from any public avenue within the limits of Mount Vernon village, unless otherwise specially granted by permit from this board. A violation of this portion of this section shall subject the offender

to a penalty of twenty-five dollars. And every privy-vault and cess-pool shall be cleaned and the contents thereof removed at least once before the first day of May, annually. Any violation of this portion of this section shall subject the offender to a penalty of ten dollars.

§ 3. All cess-pools hereafter constructed shall not be less than eight feet in depth and provided with a cover so constructed as to allow of free ventilation and admission of occasional disinfectants and removal of its contents. Privy-vaults shall not be less than four feet in depth.

§ 4. It shall be the duty of all persons occupying houses or parts thereof, for living or other purposes, wherein exist sinks, water-closets, waste-pipes and traps of such, to keep the same in a thorough state of cleanliness; and all owners, lessees, or agents of any house shall see that all waste-pipes, traps, sinks, water-closets, cess-pools, privy-vaults and drainage of such premises are kept in a thorough state of repair. A violation of this section shall subject the offender to a penalty of ten dollars.

§ 5. No owner or lessee shall allow any stagnant water, filth or rubbish at any time of any kind to remain on his or her premises; neither shall said parties allow any dead carcasses or other unwholesome substances to remain upon his or her premises, within the limits of said village, but shall promptly remove or bury the same not less than three feet below the surface in every instance. Neither shall any person permit water, slops or filth of any kind to run from his or her lot into any street or avenue in said village, excepting such water as may result from rain or snow. A violation of this section shall subject the offender to a penalty of ten dollars.

§ 6. No owner, manager, agent or corporation shall allow the existence of any nuisance on or within the limits of any building or other premises over which they have control, within the limits of the village of Mount Vernon. And all water-closets, water and waste-pipes, privies and cess-pools that may exist on said premises controlled by said owner, manager or agent or corporation shall be kept in a thorough state of repair and in a healtful condition, under a penalty of ten dollars for each and every violation of this section.

§ 7. It shall be the duty of every contractor or person, his agents or employees, who have contracted and engaged to remove any dead, diseased animal, rubbish, garbage or filth, or the contents of any privy-vault, cess-pool or other noxious substances, to do the same with dispatch, in a manner as cleanly and as little offensive and with as little danger and injury to life and health as possible. And the contents of all privy-vaults and cess-pools shall be removed dur-

ing the annual period mentioned — section 2 — and between the hours of 11 P. M. and 4 A. M.; the said contents shall be carried away in water-tight tanks and well covered. A violation of this section shall subject the offender to a penalty of ten dollars.

§ 8. The work of emptying and cleansing said privy-vaults, cesspools and the like shall be performed *only* by such persons as shall be licensed to do the same by the proper authorities of this village, and in accordance with the instructions and restrictions above mentioned, and in all cases previous to said work being undertaken or performed, a permit from the board of health, indorsed by the health officer, shall be first obtained by the public scavenger. Any violation of this section shall subject the offender to a penalty of ten dollars.

SECTION 1. Any non-observance or violation of any of the rules, regulations or ordinances herein made or hereafter to be made by the said board of health of the village of Mount Vernon shall be punishable by the imposing of penalties heretofore specified or prosecution for misdemeanor as provided by law.

FROM LAST ANNUAL REPORT OF THE VILLAGE HEALTH OFFICER.

Mr. President and Gentlemen of the Board of Trustees:

The chairman of your committee on health has asked me to make a report to you on the present sanitary condition of our village, and also what action, in my opinion, is required to improve our surroundings and make us ready to combat cholera and any other contagious disease or epidemic which may arise.

We have passed through a remarkably healthy summer. Our death-rate has been low; and, with the exception of a few isolated cases of scarlet fever and diphtheria, we have not had any epidemic diseases. Just now there is more sickness than at any other time during the year. Scarlet fever, at present, in a mild form, has appeared in several parts of the village and seems to be spreading. The physicians, as a general thing, notify me of contagious diseases occurring in their practice. In cases where the danger of spreading the disease appears at all likely, I have visited the residence of the afflicted, and enjoined those in charge to use more than ordinary care. But it is hardly to be expected, with the present state of the weather, and the bad sanitary conditions of some localities in our

village, that we can escape an epidemic. And if, as seems very probable, cholera reaches this country, we will only escape by fortune, or a better sanitary condition and the endowment of more prompt means than we have at present to meet an emergency. It is safe to say, that within an area bounded by First and Second streets and Third and Sixth avenues, there is not a well from which it is safe to use water. The soil in a large part of this territory is sewage-soaked to saturation. There is no ordinance now in force relating to privy-vaults. I am aware that a code was adopted some time ago, but by a body declared illegal by your counsel. The open sewer through the swamp north of the depot cannot but be a source of disease with favorable atmospheric conditions. With a large number of buildings continually going up, there is no supervision of the construction of vaults or the location of wells; and this neglect we will undoubtedly suffer at no distant time.

In the meantime I would respectfully report to you, for immediate abatement, the nuisances existing in the rear of the brick buildings on the west side of Fourth avenue. An old blind sewer ditch is choked and overflowing, especially in the house of Mr. Bernstein, clothier. The wells are contaminated by it, and there is a large accumulation of ashes and garbage in some of the yards; this matter should be attended to during the cold weather, as the disturbance of the super-saturated soil would be capable of creating an epidemic if it should be disturbed during the hot weather.

Respectfully submitted,
E. F. BRUSH, M. D.,
Health Officer.

Dec. 16, 1884.

A system of sewers for storm water is laid in Third, Fourth and Fifth avenues and joined in First street. A village ordinance imposes a fine of $25 for emptying sewage into these sewers. That such sewage finds its way into these sewers there can be no doubt. I was informed by several residents that the following is one way in which this is accomplished, though, of course, their sewage was not connected but they could and did mention names of parties who, they would make affidavit, did do so. A resident asks permission to connect a drain from a damp cellar with the street sewer which shall also carry the overflow from the cistern or rain water from the roof. This is readily granted. He has a cess-pool and privy-vault already

connected with each other. The sewer drain is led to the cess-pool and the rain water is turned into the privy-vault, so the surplus rain water find its way to the sewer through said vault and cess-pool. Direct proof against an individual can only be obtained by excavating and following up the connection from the sewer.

Many of the privy-vaults are inside or very near the dwellings and are very offensive. One of these in the block between Fourth and Fifth avenues on First street, although cleaned a few days before, was so noisome as to attract attention passing in the street. In justice I would state that a minority of the trustees are in favor of better sanitary inspection, but seem powerless.

A small brook running from a spring-hole near Fourth street and Eighth avenue in a direction a little north of west emptied formerly into the marsh near the present sewer outlet. It was the practice to empty house drains into its channel and set privies over it, when possible, especially below Second street. The extension of the pipe sewer up Fifth avenue intercepted this stream near Second street. The old channel with its connections now lies — covered lightly — in the block bounded by First and Second streets and Fourth and Fifth avenues and is a vile nuisance. A clothing dealer on Fourth avenue in extending his store intercepted this drain, and as a consequence has sewage in his cellar and seems helpless to rid himself of it. This nuisance should be abated immediately by the health officer, who mentions it in his report.

The New Haven railroad maintains a nuisance along the track where the drain emptying the contents of the depot privies ends. This drain should be continued to the brook and connected with the sewer proposed below.

These nuisances are mentioned here incidentally, not as being all that need immediate attention, but as coming under my personal observation during a stop in the village inspecting a complaint connected with the sewage disposal of the system ending north of the depot in the edge of the

Peat Swamp.

There is a peat swamp or marsh containing about eighteen acres lying north of the New Haven railroad and east of Fourth avenue, partly in the corporation of Mount Vernon and partly in the suburb of Chester Hill. It is of the same character as many others in this county, being originally a lake gradually filling up with peat and other vegetable matter. In one portion a rod has been pushed down thirty-six feet without meeting with much resistance, the peat runs

gradually thinner toward the edges of the marsh. Third avenue has been partially graded through the marsh with the effect of dividing it into ponds of stagnant water. Surrounded as it is by residences, lying so close to the thickly settled portion of the village, and receiving so much sewage and filth, renders it a nuisance detrimental to public health. It can be readily drained, there being twenty feet fall in the outlet within half a mile. I understand a law enabling the village to obtain and improve it as a park is talked of. It should be drained as soon as possible without waiting for the legislation just referred to.

Near the south-west corner of this swamp the present sewer outlet is located, about 400 feet north of the New Haven depot and fifty feet east of Fourth avenue; from here the sewage flows sluggishly through an open box sewer about four feet wide and two feet deep for a distance of about 800 feet, where it joins a larger stream of spring water from the north-west and flows easterly to Hutchinson's creek. It is this brook, from the sewer outlet toward the creek, flowing as it does near residences, that has caused the present complaint.

This brook passes out of the corporation of Mount Vernon into the suburb of Chester Hill, thence into the town of East Chester proper, which rather complicates the matter of jurisdiction. I took a sample of water from the brook near the point where it disappears in a covered drain at the corner of Third street and Sixth avenue, where the stream would pass through a pipe one inch in diameter at the time of my visit. Also samples of the sewage at the sewer outlet, where the flow was at least fifty times as great. The contamination of the water between these points is very apparent both to the eye and nose. The samples were taken on Thursday at 3 P. M., which is not the time the cess-pools would usually be flushed with laundry waste-water, nor the time of day when fœcal matter would usually be most prevalent. As there had been no rain for many days street washings and other gutter filth would be less liable to be in the sewage.

There was an offensive odor arising at and below the sewer outlet, while solid matter nearly covered the surface of the stream and was seen clinging to pebbles and other points in the channel all the way down for over half a mile. At places where the sun shone on the brook bubbles of gas rose from the sediment in the bottom, showing conclusively that fermentation was going on. The present health officer was out of town, but I met his predecessor, Dr. B. G. Burnett,

now of New York, who was health officer from 1880–3. He informed me that he had issued burial permits, when in office, for at least thirty cases of death from bronchial consumption, scarlet fever, typhoid fever, dysentery, bloody-flux and diphtheria, most cases attributed by him to the unsanitary condition of this part of the village.

With a public water supply more water will be used, the ground will become more saturated with filth, and to a greater depth which will tend to make the use of common wells, by those who cling to them, more dangerous than at present, and they should be abandoned in the more thickly settled portion of the village.

PROPOSED REMEDY.

I heartily approve the recommendation of Mr. Andrews as to the intercepting sewer to remedy the cause of this complaint. The village should adopt the separate system of sewers and disconnect all house drains from the present system. The water supply now furnished will provide water for the necessary flushing tanks. This intercepting sewer must necessarily pass through what is now private property. It will be well on this account, as well as to avoid rock excavation as much as possible, to lay this sewer near the channel of the present brook, through and near the village. I was informed that the right of way for the sewer would be gladly given by the various owners along the brook. I would call attention to the reports of Messrs. Andrews, Adams & Towle, as to the present need and advantages for sewage precipitation, when desirable, near Hutchinson's creek. Respectfully submitted,

O. S. WILSON, C. E.

April 25, 1885.

LABORATORY, ALBANY MEDICAL COLLEGE,
ALBANY, N. Y., *April* 27, 1885.

JAMES T. GARDINER, Esq., *Chairman of the Committee on Drainage of the State Board of Health, Albany, N. Y.:*

DEAR SIR — Agreeably to your instructions, I have made an analysis of the contents of the demijohn secured from you on the 24th inst., and labeled "sample of sewage of Mount Vernon, taken at 3 P. M., April 23d."

A gelatinous scum floated upon the surface, and the liquid had an opalescent appearance, and a slightly greenish color when viewed in a two foot tube. It was translucent, but not transparent.

At 100° Fahr., its odor was fetid and highly disagreeable.

The results of the analysis are as follows:

	Parts per 100,000.	Parts per Million.	Grains per U. S. Gallon.
Chlorine	7.40	74.00	4 32
Free Ammonia	0.5700	5.700	0.3327
Albuminoid Ammonia	0.2550	2.550	0.1488
Organic and Volatile matter	21.40	214.00	12.49
Mineral matter	22.90	229.00	13.37
Total solids	44.30	443.00	25.86

I should consider this liquid to be sewage in the sense that the word "sewage" is ordinarily employed, basing the opinion upon the sensible properties and the results of the chemical analysis of the fluid.

Yours very respectfully,

WILLIS G. TUCKER.

ALBANY MEDICAL COLLEGE,
ALBANY, N. Y., *April* 24, 1885.

DEAR SIR — Examination of sample of sewage from mouth of sewer, Mount Vernon, April 23, 1885, I find: It is a highly putrescent fluid, very foul and offensive, with a distinctly fœcal odor and considerable solid matters in suspension. It contains 8.75 of chlorine in parts of 100,000. It is swarming with numerous forms of scavenger bacteria and infusorial life; there is also a large amount of decaying vegetable and animal matters present.

Such a noxious compound is certainly dangerous to public health (under favoring circumstances it would spread contagion far and wide). Its proper disposal should demand immediate attention.

Very truly,

WM. HAILES,
Albany Medical College.

JAMES T. GARDINER,
Director of State Survey.

Pollution of the Water Supply of Binghamton by the Sewage from the Insane Asylum.

Office of Health Officer,
Binghamton, N. Y., *February* 20, 1885.

Alfred L. Carroll, M. D., *Secretary State Board of Health:*

Dear Sir—Numerous complaints having been made in an informal manner to the Board of Health of this city concerning the emptying of sewage from the Chronic Insane Asylum, located near this city, into the Susquehanna river, the Board, at its last meeting, directed me to communicate with you as Secretary of the State Board of Health concerning it. The asylum is situated two miles east of the city on an eminence near the river. About midway between that and the central portion of the city is situated the water-works, which supply the city with water. The water for the city's supply is taken partly from wells and partly from the river, and a portion of the time, as is the case at the present, a large portion is taken from the river. The sewer from the asylum empties into the river about a mile above the water-works, where the supply of water for the city is taken from the river. The asylum at the present time contains between 600 and 700 patients besides the attendants and attaches, which will probably make the number of persons in the institution at least 700, and the prospects are that, with increased facilities for accommodating a larger number, there will, in the near future, be not less than 1,000 or 1,500 inmates of the institution. From the sewage of so large a number of persons entering the river so near the city, and its source of water supply, our citizens are becoming alarmed as to its effects upon the lives and health of the people, and are asking from the local Board of Health some relief from the dangers which seem to be threatening them. Now what this board of health wants to know is what is necessary to be done, or in what manner to proceed to prevent this sewage being emptied into the river at the point and in the manner that it is. The asylum property being State property, complicates the matter somewhat in the minds of members of this board, and hence their directions to me to communicate with the State Board of Health for instruction in the matter. The prospect of cholera making its appearance in this country the coming season makes them feel the necessity for vigilance in the matter of prevention.

An early reply, with such instructions as you may give, is earnestly requested. Very truly yours,

C. D. SPENCER, M. D.,
Health Officer and Secretary Board of Health.

COMMITTEE'S REPORT.

In the latter part of February last, the board of health of the city of Binghamton appealed to the State Board of Health to investigate and report on the pollution of the Susquehanna river, by the sewage from the Asylum for the Chronic Insane, located about two miles above the city, and near the bank of the stream.

Some two years ago when an outbreak of so-called winter cholera occurred at Binghamton, the defilement of the river by sewage entered into the investigation.

The physicians at Binghamton state that more or less uneasiness and alarm are felt in the city, concerning the purity of the water supply, and that this uneasiness is readily increased whenever epidemics of zymotic character occur. The fact that sewage is being emptied into the river within two miles of the water-works is considered a standing menace to the health of the city.

In response to the application of the local board of health, Horace Andrews, C. E., was sent to investigate the facts, and his report is hereto appended.

It appears that "for a number of years the supply of water of Binghamton has been obtained from two large wells situated on the northern bank of the Susquehanna river and east of the city. Although the wells are only about one hundred and fifty feet from the river, there is reason to believe that the water running into them does not filter in from the river, but comes from the north and flows toward the river."

In other words, Binghamton has been supplied with the ground-water of the Susquehanna valley, but owing to the rapid growth in population and the increased consumption of water, the ground-water can no longer be relied upon to furnish sufficient quantities for the use of the city; so that a supplemental supply must be obtained by pumping directly from the river, and indeed the river has already been drawn upon when the ground-water has been insufficient. In future the city must depend upon the river for an increasing proportion of its water; so that the question of purity of the stream becomes of much greater importance than it has been in the past.

In 1883, when Emil Kuichling, C. E., examined the sanitary condition of Binghamton for the State Board of Health, he reported that the river was being defiled by the sewage from the Susquehanna Valley Orphans' Home, the sewer from which enters the river half a mile above the pumping station. Mr. Andrews finds that the sewage from the orphanage is still allowed to drain into the river. We recommend that this should be stopped. The local health authorities should see that the sewage from the Orphans' Home is disposed of in some other manner than by draining it into the Susquehanna river.

One and seven-eighths miles above the pumping station the filtered sewage from the Asylum for the Chronic Insane, a State institution, is allowed to enter the river, the quantity being some sixty thousand gallons per diem. The institution contains six or seven hundred inmates besides the officers. It is regarded as probable that the inmates and officers may be increased to from twelve to fifteen hundred in the future.

At a point five or six hundred feet from the main building the sewage is filtered through about five feet of charcoal. The filter is said to be changed every six months. The character of the effluent as it flows from the filters of the institution shows that it still contains a very large amount of putrescible material, and is only purified so far as the suspended matter in it is concerned, while the large proportion that is soluble passes on to the Susquehanna river.

A quarter of a mile below is situated the pumping station for the water supply of the insane asylum. Exactly what the low water flow of the Susquehanna river is we have been unable to ascertain: but it is already small and is probably annually decreasing, while the sewage from the asylum must continue to increase. We are clearly of the opinion that the sewage from the asylum is a possible source of danger to the water supply, both of the asylum and of the city of Binghamton, and that, in its present state, it should not be allowed to enter the Susquehanna river above the points of in-take for these water supplies.

At the request of the committee, Mr. Andrews considered the question of the purification of sewage by irrigation and by chemical treatment, as compared with its disposal through a drain entering the Susquehanna river below the pumping station. He finds, that the ground is not well adapted to irrigation. Even if irrigation were practicable, the condition of the effluent from the sewage farms

in England does not justify the admission of the purified sewage into a stream which is used as a water supply.

As regards chemical treatment, Mr. Andrews finds that the annual cost of treating the sewage would probably be from $6,000 to $9,000; that is to say, this would be the amount of capital required to be placed at interest in order to furnish the sum annually needed to defray the cost of chemicals and labor and to pay for the tanks. Were there no other method of disposal, purification by chemical treatment would certainly be a great improvement on mere filtration, as used at present; but even chemical treatment does not so purify the effluent that it can be turned into a stream used immediately below for drinking purposes.

It seems that the insane asylum is so situated, that the sewage can be discharged into the Susquehanna river below the Binghamton dam by a vitrified pipe from eight to nine inches in diameter and some 14,000 feet long. Here the sewage would enter the river at a point where it is already contaminated by the sewers from the city of Binghamton, and no additional harm could be done to the stream. It is not known that within the limits of this State the river is used for drinking purposes below this point. The estimated cost of laying this pipe is $8,160, to which for safety Mr. Andrews adds twenty-five per cent to cover contingencies, making a total of $10,000.94.

The difference between the estimate of cost of this outfall sewer and that for a method of chemical purification is slight; while the advantages are greatly in favor of the outfall sewer which will furnish a complete and permanent means for disposing of the sewage of the insane asylum in such a way as to prevent all question regarding the pollution of the river.

RECOMMENDATIONS.

First. In view of these facts we recommend that the authorities in charge of the Binghamton Insane Asylum construct an outfall sewer of vitrified pipe, in accordance with the report of Mr. Andrews, to deliver the sewage of the asylum at a suitable point below the Binghamton dam.

Second. We also recommend that the local health authorities having jurisdiction prevent the discharge of sewage from the Susque-

hanna Valley Orphan Home into the river above the water-works' in-take.

Respectfully submitted,

JAMES T. GARDINER, *Chairman*,
ERASTUS BROOKS,
GEORGE W. COOKE, M. D.,
EDWARD M. MOORE, M. D, *President*,
ALFRED L. CARROLL, *Secretary*,
Committee on Drainage, Sewerage and Topography.

At the meeting of the State Board of Health on the 11th February the above report was presented and adopted by the Board.

ALFRED L. CARROLL,
Secretary.

Engineer's Report.

James T. Gardiner, Esq., *Chairman of Committee on Drainage, Sewerage and Topography:*

Sir — In accordance with your instructions I have examined into the conditions that have recently been the subject of complaint to the State Board of Health from the health officer and board of health of Binghamton. My report as to the facts observed and suggestions as to a remedy for the evils that are manifest are herewith submitted.

The Water Supply of Binghamton.

For a number of years a supply of water has been obtained from two large wells situated on the north bank of the Susquehanna river and just east of the city. Although the wells are only about 150 feet from the river, there is reason to believe that the water running into them does not filter in from the river but comes from the north and flows toward the river. Attempts to increase the water supply by driving pipes into the bottoms of the wells to various depths have only been moderately successful. A third well, 179 feet long and ten feet wide, was dug in 1883, just east of the pumping-works, but it has not increased the supply as much as was anticipated. There have been times, occurring occasionally for a number of years, when, either on account of drought or excessive consumption of water, it has been necessary to draw water directly from the river. There is no reservoir connected with the pumping-works, the water being kept under a constant pressure in the mains by the pumps, according to the Holley system. It is, therefore, quite necessary to the welfare of the city that an abundance of water should be always available at

the pumping-works. Binghamton is steadily and rapidly increasing in size. Its population since it was incorporated in 1867 has been as follows:

1870	12,692	inhabitants	
1875	15,518	do	
1880	17,315	do	
1885	19,500	do	(estimated).

In addition to the increased consumption of water due to the growth of the city, the further completion of the system of sewers that are now being built will undoubtedly make still more heavy demands upon the supply. In view of these facts the water commissioners feel compelled to regard the Susquehanna river as the source from which a large and increasing amount of water must be pumped in the near future.

THE SUSQUEHANNA RIVER AS A SOURCE OF WATER SUPPLY.

The Susquehanna river would appear to be quite as unobjectionable a source of supply as other rivers of its size and with proper care to prevent pollution it may fairly be regarded as an exceptionally good supply. Chemical analysis has shown that the water is of fair purity. The nearest village up the river is Great Bend in Pennsylvania, thirteen and one-half miles from Binghamton, and containing about 550 inhabitants. There are no considerable towns draining into the river for at least sixty miles above Binghamton.

Only a short distance above the pumping-works there are sources of contamination, however, which can be done away with at little trouble and at moderate expense. The chief of these pollutions is the cause of the present complaint.

CONTAMINATION FROM THE SEWAGE OF THE BINGHAMTON ASYLUM FOR THE CHRONIC INSANE.

The insane asylum is supplied with water from the Susquehanna river by means of a pumping engine situated on the banks of the river. A liberal amount of water is used at the asylum, amounting to about 60,000 gallons daily on the average. There are at present between 600 and 700 inmates in the asylum beside the officers. It is regarded probable that the number of inmates and officers may be increased to 1,200 or 1,500 in the future.

The sewage from the asylum is carried by drain pipes to a point 500 or 600 feet from the main building and forty or fifty feet below it, where it is discharged into two filtering tanks placed upon the brink of a ravine.

These filters are used alternately so that one may be cleaned out while the other is in operation.

The filters are constructed by first excavating a circular pit about fifty feet in diameter and six feet in depth. A wall of stone and cement masonry, two feet in thickness, is built as a lining to the pit; within this retaining wall and at a distance of five feet from it, a brick wall about one foot thick is built, the bricks being rather loosely laid. The annular space between the two walls is nearly filled with wood charcoal, and this is loaded with stones to keep it in place. The sewage is poured into the inner tank at the top, and the liquids filter through the brick wall and the charcoal till they are finally discharged at the bottom of the pit. The filtered sewage, which is still somewhat turbid, flows down a small ravine or gulley for about a third of a mile, till it is discharged into the river about a quarter of a mile above the in-take of the asylum pumping-works, and about $1\frac{7}{8}$ miles above the Binghamton water-works.

It is evident that the filtration merely removes the coarse particles held in suspension in the sewage, for the effluent water causes a slimy deposit on objects over which it flows. It is not reasonable to suppose that the charcoal can operate to purify the sewage, by oxidizing its organic matters, for more than a few days at the longest before its pores become clogged. The charcoal is renewed only once in six months, and indeed it would be a very difficult and expensive undertaking to renew it much oftener. The purification of sewage by mechanical filtration has been tried at many places but never with very great success; better methods for the purpose have been devised and are much to be preferred.

There is certainly no question that the asylum sewage as now discharged into the river is a source of contamination of a most disgusting nature; moreover its discharge immediately above the point at which water is taken for the inmates of the iustitution makes the evil peculiarly revolting.

Remedies.

There are three remedies, either of which would decidedly improve the present condition of affairs.

First.— Sewage Irrigation.

Instead of discharging the effluent from the filters into the ravine, it might be allowed to flow on suitably prepared land where it could be utilized as a manure. Unfortunately the soil in the neighborhood

of the asylum is poorly adapted for treating the sewage in this manner; a very compact hard-pan underlies the surface soil at the depth of less than two feet, and extensive underdraining would be required. The present filters are too far below the necessary level to allow the effluent to reach the prepared land by gravitation, and they would have to be abandoned or pumping resorted to.

If the sewage was taken to a distance from the asylum where suitable soil could be found for irrigation, the expense of the necessary pipes, together with the fact that the irrigated land would not be under the control of the authorities at the asylum, would have to be considered as objections to this plan. If it were not for the fact that other and less troublesome methods of disposal can be secured at moderate expense, the method of irrigation would, however, deserve careful attention.

Second. Chemical Treatment.

The sewage could be treated with chemicals and the effluent discharged as at present. The purification of sewage has been so little tried in this country, that the expense for chemicals would necessarily be large until these should be produced in the crude state in greater quantities and at lower prices.

The recent investigations of Mr. Samuel M. Gray, C. E., of Providence, R. I., have furnished information regarding the amount of chemicals used, and the expense at several cities in England; from his statistics the facts in relation to these points have been derived. The process of chemical treatment, known as the "Coventry process," where alum, copperas and lime are employed, is one of the best as regards purity of effluent. This process is used in Coventry with 45,000 inhabitants, Hertford with 8,000, and Leyton with about 35,000. The daily amount of sewage treated at these places is 2,250,000 gallons, 2,000,000 gallons, and 1,000,000 gallons, respectively. With such wide differences in the dilution of the sewage, it is evident that the amount of chemicals, and the cost of the same, should be considered on the basis of the number of the population, and not that of the amount of sewage treated; this procedure is justifiable, since the entire amount of sewage produced is treated at each place.

The following table shows the amount of chemicals used and their cost at each of the cities named for one week and for 1,000 inhabitants.

	CRUDE ALUM.		COPPERAS.		LIME.		Total Cost
	Lbs.	Cost.	Lbs.	Cost.	Lbs.	Cost.	
Coventry....	249	$1 62	30	$0 11	174	$0 24	$1 97
Hertford....	182	1 36	140	30	70	9	1 75
Leyton.....	192	1 12	32	21	176	35	1 68

About 400 pounds per day of partially dried sludge, containing about one-half its weight of water, is obtained from the sewage of 1,000 persons.

The copperas and alum are together dissolved in a small quantity of sewage-water, and then mixed with the sewage, after which the lime, separately slaked and mixed with sewage-water, is added and stirred in. After the precipitation has been effected, which requires about one hour, the water is drawn off and the semi-liquid sludge, which is nearly inodorous, is either dried up by pressure or by the evaporation of its water in the open air.

It should be said that the effluent water is still somewhat objectionable; the report on the treatment of the London sewage, which was tried experimentally on a large scale last summer, states that: "No system of single precipitation is capable of the production of an effluent free from sewage odor, even when the precipitants are used in excessive quantities. In order to obtain an inodorous effluent it would be necessary to employ a system of precipitation supplemented by treatment with a deodorizing agent, by filtration through well-burnt and carbonized clay, or by irrigation over an extended area."

The chief item of expense for chemicals in the cities referred to was that for alum; by omitting this, as was done in the London experiments, the expense for chemicals was only about one-quarter as great as when it was used. The sludge obtained where alum is not employed is more fluid than if it were used, but this would not be a very great objection where a small quantity only was to be dealt with.

Expense of Chemical Treatment.

To treat the sewage of 1,000 inmates of the asylum it would be advisable to construct two tanks, each about 170 feet by twenty feet, and

four feet in depth. Each tank could hold the entire amount of sewage discharged in one day; with well-built sides of masonry they would cost about $450 each.

If copperas and lime only were used, about 100 pounds of the former and 350 pounds of the latter would be needed each week, costing eighty cents and $1.40 respectively, at the present rates in this country, or $114.40 per year. The effluent would be improved by further treatment with some deodorizer, such as the permanganate of sodium or potassium, but these are at present much too expensive chemicals to employ for this purpose; their cost here is about $40 per 100 pounds, although permanganate of sodium cost in London, when manufactured for the purpose of sewage purification, only $3.80 per 100 pounds. The present filters might be employed with advantage for purifying the effluent to a certain extent by charcoal filtration.

One man employed one-half the time would be sufficient to mix the chemicals and remove the sludge. Capitalizing the various items of expense, the approximate cost of chemical treatment would be —

Two tanks of 100,000 gallons capacity each	$900 00
Chemicals at $114.40 per year, capitalized at three and a half per cent	3,270 00
One-half of one man's labor, at $360 per year, capitalized at three and a half per cent	5,142 00
Total capital	$9,312 00

To offset this expense a manure would be obtained that should be somewhat better in quality and greater in quantity than that obtained from the present filters.

The process of chemical treatment has been so little developed in this country that the cost must be somewhat excessive at first. At the asylum the present filters demand a considerable amount of care, which would cost but little more if chemicals were used. An inferior quality of lime might be procured that would reduce the cost for that item. It would be a fairer estimate, therefore, to place the cost of chemicals and labor required in addition to that now employed as equivalent to a capital of $5,250, making the entire cost, with the precipitation tanks, $6,150. The annual outlay for chemicals and labor is here assumed to be $183.75.

It would be advisable to exclude storm-water from the sewage, to avoid unnecessary dilution if chemical treatment were to be attempted.

Since it is not known that the specific causes of disease that can be attributed to contaminated drinking-water are destroyed by chemical treatment as ordinarily employed, and since the water supply of the asylum is so near its sewage outfall, the purification of the sewage by the methods described can be regarded only as an expedient to be preferred to that now employed, and of moderate cost.

Third. Outfall Sewer.

The most certain and the most desirable method of preventing the contamination of the Susquehanna river at the places from which it is taken at Binghamton and at the asylum would be to discharge the asylum sewage below the dam that has been placed across the river at Binghamton. It might be urged that the river would be just as badly polluted as ever below Binghamton, but there are so many causes of pollution below the city that it can no longer be regarded as a suitable water supply beyond the Chenango river junction. Oswego draws its water supply from other sources, while adding its share of defilement to the river. Binghamton itself has recently adopted plans for a complete sewerage system, devised by Mr. Hering. The separate system is to be used, and construction will progress as rapidly as funds can be raised. There is no reason, therefore, why the asylum sewage should not be discharged into the river below the water-works, and since the current is much retarded by the dam, the sewage should be taken at least as far down the river as that point. The city sewers are to discharge at the junction of the Susquehanna and Chenango rivers, and the city authorities may deem it advisable to so alter their plans as to receive the asylum sewage into their pipes when they are laid. It would certainly be a great and much desired relief to the residents of Binghamton if the sewage could be discharged at the dam, and the question of taking it further down the river could be considered in future, without altering any plans that may now be made for discharging it at the dam.

Cost of Outfall Sewer.

A very close estimate of the cost of the necessary outfall sewer, with man-holes, etc., cannot be made without careful surveys. The

superintendent of the asylum, Dr. T. S. Armstrong, has obtained an approximate estimate of the necessary quantities.

About 14,100 feet of sewer-pipe are required, 4,300 feet of which would have a considerable grade, and would require a pipe no larger than eight inches in diameter. The remaining 9,800 feet of pipe would be laid on a light grade, estimated at five feet to the mile; a nine-inch pipe would be amply large, if this grade can be secured, to discharge from two to three times the amount of sewage produced by 1,000 persons.

It is the intention of the authorities at the asylum to filter the sewage, as at present, so as to obtain as much fertilizing material as possible for use on the asylum farm, hence the liquid to be carried by the sewer will be entirely free from any substances that could cause stoppage in the pipes.

Regarding the quantities furnished by Dr. Armstrong as sufficiently close for a preliminary estimate, and making a liberal allowance for contingencies, in view of the imperfect knowledge of the necessary data, the following estimate of cost is arrived at:

Quantities.	Description.	Price.	Amount.
12,795	Cubic yards excavation	25c.	$3,198 75
4,300	Lineal feet, 8 inches vitrified pipe laid	20c.	860 00
9,800	Lineal feet, 9 inches vitrified pipe laid	4c.	2,352 00
300	Cubic yards, retaining and slope walls	$1 50	450 00
20	Man-holes	50 00	1,000 00
20	Lamp-holes	15 00	300 00
			$8,160 75
	Add 25 per cent for contingencies and engineering		2,040 19
	Total		$10,200 94

With favorable contracts the pipe may even cost less than the above figures, while in view of the fact that the excavation will probably be of an easy nature, the estimate for that item would seem an ample one.

It would seem, considering all the circumstances, that the outfall sewer is to be preferred to any other method of disposal of the asylum sewage. By no other plan can the sewage be removed with as little trouble, and the cost will be small when the number of persons benefited is considered.

Other Sources of Contamination.

It is stated that the sewage from the Susquehanna Valley Orphans' Home, which is not a State institution, still finds its way into the river above the in-take of the Binghamton water-works, and that the conditions fully described by Emil Kuichling, C. E., in his report to the State Board of Health, embodied in their third annual report to the Legislature, pages 248–250, still exist and have not been modified for the better. It furthermore appears that it is quite easy for the city authorities to compel this institution to adopt some mode of sewage disposal that will meet the sanitary requirements of the case.

The city water supply of Binghamton will certainly not be above reproach until the pollution from the Valley Home is stopped. Since the sewage from the Home is small in amount, and there is abundance of land available, it may be found that the entire amount may readily be utilized for irrigation purposes. To discharge the sewage below the dam, a pipe sewer of moderate length only would be required.

Very respectfully,

HORACE ANDREWS, Jr., *C. E.*

Albany, *March* 26, 1885.

Proposed Plan for Removing the Sewage of the Binghamton Insane Asylum.

The attached plan and specifications for constructing a sewer of iron and vitrified pipe from the Binghamton Insane Asylum to the Court street sewer, in Binghamton is hereby recommended for the approval of the State Board of Health.

JAMES T. GARDINER,
Consulting Engineer.

To the Committee on Drainage, Sewerage and Topography, of the State Board of Health:

Gentlemen — I have been authorized by the trustees of the Asylum for the Chronic Insane, at Binghamton, to prepare plans for an outfall sewer from the asylum, and to submit the same with drawings and profiles to you for approval; in accordance with section 4 of chapter 399 of the Laws of New York, of 1885. After a careful examination of the ground and of the existing conditions, with due consideration of future possibilities, I have prepared the plan first mentioned below, but at the request of the trustees, the changes or modifications of the plan afterward referred to, are given also, in order that the committee may give their decision as to which plan for sewage disposal shall be definitely adopted.

PROPOSED PLAN.

It is the declared intention of the trustees to continue the use of filters or screens for removing the coarser solids from the sewage, and it is desirable that this should be done, both on account of the manurial value of such screenings and in order that large solid bodies may be kept out of the pipes.

From the present filters it is proposed to lay an eight-inch vitrified pipe through the asylum grounds for a distance of 2,596 feet; the pipe is to be laid in six straight lengths with man-holes at the bends. On two of the straight lengths a change of grade is made, to avoid deep cutting, and lamp holes are to be placed at these vertical bends. There is no grade in the eight-inch pipe of less than eight in 1,000, at which grade the pipe when running *half full*, would discharge about 38 cubic feet per minute, or over 400,000 gallons per day.

The amount of sewage now produced at the asylum can be closely estimated, since the water is approximately gauged as it is pumped from the river; it is doubtful whether it ever exceeds or equals 100,000 gallons per day, but ample provision has been made for 300,000 to 400,000 gallons in the plan proposed.

Rain-water from the roofs, when not used for laundry or other purposes, should not be allowed to needlessly increase the volume of sewage, and in the new buildings now being erected provision should be made to exclude rain-water from the sewers.

The eight-inch pipe terminates at a point on the south side of the asylum carriage drive, where a man-hole is to be placed; from this man-hole a six-inch cast-iron pipe, calked, and jointed with lead, conveys the sewage along the south side of the carriage drive to Court street, thence along the south side of Court street to the railroad crossing, from which point the sewer must be laid nearly in the center of the street, to avoid the water pipes, for a total distance of 8,622 feet.

The lowest point in the iron pipe is reached in front of the pumping works of Binghamton, where it is only three feet above the river and eighty-eight and one-half feet below the point at which it commences in the asylum grounds. From this low point the pipe rises, as it proceeds westward along Court street, about twenty-five and one-half feet, and terminates at a point on Court street a short distance west of Liberty street. The western extremity of the iron pipe will be 63.05 feet below its eastern end.

The six-inch pipe, when running full, is capable of discharging under the head mentioned, 36.87 cubic feet per minute, or 398,000 gallons per day; it is evident, therefore, that its capacity will be ample under maximum conditions. When only a small amount of sewage is being discharged the velocity of flow in the lower parts of the pipe will be very small, amounting to only twenty-five and one-half feet per minute for a discharge of five cubic feet per minute. Since the pipe is in the condition of an ordinary water-main this low velocity can occasion no stoppage, however, for the moment that

solids are precipitated the head of water will be augmented and the velocity of flow will be sufficiently increased to cause the deposited solids to be again put in motion. No better self-cleansing sewer could be devised in fact, for before an entire stoppage can occur in the lower portions of the pipe a water pressure of over 700 pounds will be brought to bear upon the obstruction. As a complete protection against the entrance of improper matters into the iron pipe it is proposed to commence the latter with a diameter of one foot, a suitable screen being placed over the end; the pipe will be diminished to its normal size of six inches, by reducers, within a few feet of its starting point.

Arrangement for Flushing.

It is designed that a suitable gate or pen-stock shall be placed at a point about 800 feet from the east end of the iron pipe; by closing this until the sewage is set back in the man-hole a flush of over 1,200 gallons could be secured. By opening the gate the stored up sewgae would run through the pipes with sufficient velocity to remove all sedimentary matters.

It is not supposed that the pen-stock will need to be used very often but it is proposed as an additional and inexpensive safeguard.

The sewage can undergo no putrefactive change within the iron pipe, since it is evident that the time required to renew its entire contents will be but a few hours. About 7,500 feet of the pipe, holding 1,473 cubic feet, or 11,045 gallons, will remain constantly filled and a flow of sewage, amounting to 2,500 gallons per hour, will cause the entire contents to be renewed once in four hours and twenty-five minutes. At times the flow of sewage may be somewhat smaller than here assumed, but such times of minimum flow will be of short duration. The filtering and screening of the sewage will be effectual safeguards against the accumulation of putrescent solids within the iron pipe, though it is not evident that such solids would do much harm within a water-tight pipe.

From the terminus of the iron pipe a ten-inch vitrified pipe of a length of 700 feet will be laid in a straight line and with a uniform grade of 3 in 1,000 to the head of Rutherford street, where the city sewer in Court street begins. The city sewer is, at first, a fifteen-inch vitrified pipe and at its dead end, where it is proposed to discharge the asylum sewage, there is no adequate provision for flushing. The dilute and filtered sewage from the asylum will tend to improve the condition of the city sewer materially.

The Court street sewer ultimately discharges into the Susquehanna river at the foot of State street, after receiving the contents of various branches, carrying the waste water of a large number of inhabitants.

The ten-inch pipe sewer, with a grade of 3 in 1,000, will discharge over 40 cubic feet per minute when running *half full*, or 432,000 gallons per day.

The advantages of the above plan are:

1st. An outlet is obtained that is as good as that of the city sewers.

2d. The sewage is raised to a sufficient height to admit of its being taken into the city sewers, whatever changes may be made in the plan of the latter.

3d. The use of iron pipe, carrying the sewage under pressure, obviates the necessity of very deep cuttings and of many man-holes; it also enables the sewage to be lifted up into the city sewers, whereas if it should be led along the river bank to a point below the Rock Bottom dam, it could not be taken into the city sewers without pumping, if at any future time the outlet below the dam should prove objectionable. By the use of iron pipe discharging into the Court street sewer, a saving of about 2,400 feet in length is effected, as compared with the route along the river bank.

4th. It is estimated, as shown below, that the entire work, including the iron pipe, can be completed within the appropriation, the greater cost of iron pipe being offset by the saving in distance and by the absence of man-holes and small depth of cutting along its course.

5th. The capacity can at any time be increased by extending its upper end. An increase in length of 600 feet would add over 20 feet to the head. It is not probable that such increase will ever be necessary.

6th. The sewer would be laid entirely in the streets and in State property.

APPROXIMATE MAXIMUM AND MINIMUM ESTIMATES OF COST OF SEWER LAID UNDER THE ABOVE-MENTIONED PLAN.

Quantities.	Description.	Maximum cost.		Minimum cost.	
2,596 ft.	8-inch vitrified pipe, laid	at $0 80	$2,076 80	at $0 50	$1,298 00
8,622 ft	6-inch iron pipe, laid	at 1 00	8,622 00	at 75	6,466 50
700 ft.	10-inch vitrified pipe, laid	at 85	595 00	at 45	315 00
9	Man-holes, complete	at 50 00	450 00	at 30 00	270 00
2	Lamp-holes, complete	at 6 00	12 00	3 00	6 00
			$11,755 80		$8,355 50

APPROXIMATE MAXIMUM AND MINIMUM ESTIMATES OF COST OF SEWER TO NEW BUILDINGS.

Quantities.	Description.	Maximum cost.		Minimum cost.	
922.2 ft.	8-inch vitrified pipe, laid	at $0 80	$737 76	at $0 50	$461 10
2	Man-holes	at 50 00	100 00	at 30 00	60 00
1	Lamp-hole	at 6 00	6 00	at 3 00	3 00
			$843 76		$524 10

Total maximum cost	$12,599 56
Total minimum cost	8,879 60
Probable cost, average of above	10,739 58

The cost of the gate or pen-stock in iron pipe is not included It would be about $40.

MODIFICATIONS OF PLAN.

If all that is desired is to secure an outlet for the asylum sewage below the city pumping-works, vitrified pipes could be laid for the entire distance from the asylum to Brandywine creek, a few hundred feet west of the water inlet, and there an outlet could be secured by laying iron pipe out to the center of the river. Only very low gradients could be secured for the pipe from the asylum grounds to Brandywine creek; a uniform slope of 2 in 1,000 could be obtained without cuttings of over twelve feet in depth. A ten or twelve-inch pipe laid at this inclination would be barely self-cleansing, when running half full, while smaller sizes running full would not have sufficient velocity of discharge to prevent the precipitation of solids. It would be necessary to store up the sewage and let it flow down only at intervals, since its volume is not sufficient to fill a ten-inch pipe to a depth at which the flow will have velocity enough to keep the sewer clean, or to use an iron pipe and take advantage of the hydraulic head for the removal of obstructions.

The plan originally contemplated for securing an outlet below the Rock Bottom dam is a practicable one, but there are serious difficulties, both from the fact that private property must be invaded, and because the engineering difficulties are considerable. From Brandywine creek westward the sewer would be laid along the abruptly sloping river bank, and unless the river could be temporarily lowered behind the dam, the trenches would need to be below the level of the water in the river for a distance of from 2,000 to 3,000 feet.

The outlet that could be secured below the dam would be no better than that of the city sewers at the foot of Carroll street, and the latter has been declared objectionable, and has been the occasion of legal controversies.

Very respectfully yours,

HORACE ANDREWS, JR., *C. E.*

ALBANY, N. Y., *July* 21, 1885.

CONTRACT AND SPECIFICATION FOR THE CONSTRUCTION OF SEWERS AND APPURTENANCES FROM THE ASYLUM FOR THE CHRONIC INSANE AT BINGHAMTON, N. Y., TO A POINT BELOW THE WATER-WORKS OF THE CITY.

This agreement made and concluded this day of , in the year one thousand eight hundred and eighty-five, by and between the *Trustees of the Binghamton Asylum for the Chronic Insane*, of the first part, and contractor , of the second part:

(A.) *Witnesseth*, That the said part of the second part ha agreed, and by these presents do agree with the said parties of the first part, for the consideration hereinafter mentioned and contained, and under the penalty expressed in a bond bearing even date with these presents and hereto annexed, to furnish at own proper cost and expense, all the necessary materials and labor, and to excavate for, and build in a good, firm, and substantial manner a sewer from the sewage filters at the Binghamton Insane Asylum to a point of discharge below the water-works of the city of Binghamton, and also, if the Trustees of the Binghamton Asylum for the Chronic Insane so direct, from the sewage filters to the new buildings now in process of erection; together with appurtenances of every kind complete, of the dimensions, in the manner, and under the conditions hereinafter specified, and ha further agreed that the said trustees shall be, and are hereby authorized to appoint their engineer and such other person or persons as they may deem proper, to inspect the materials to be furnished, and the work to be done under this agreement, and to see that the same correspond with the specification hereinafter set forth, to-wit:

(B.) SPECIFICATION.

Location (1). The sewers shall be located on the lines, shown in the plans of the work, which are approved by the State Board of Health of New York and will be staked out by the engineer.

Excavation (2). The ground shall be excavated in open trenches one foot wider on each side than the exterior diameter of the sewer, and to the necessary depth.

Shoring (3). The contractor shall furnish and put in place suitable sheet-planking and bracing wherever necessary to support the sides of the excavation.

The sheeting and bracing shall be removed as the work progresses in such manner as to prevent the caving in of the sides of the excavation; all vacancies left by the plank while being drawn shall be carefully filled, as may be directed by the engineer. The engineer may order the sheeting and bracing left in, when in his opinion it is necessary for the protection of the work, and such lumber shall be paid for as provided in article (E) of this agreement.

Drainage (4). The contractor shall, at his own expense, keep the excavation free of water while the foundations, masonry, or pipe are being laid, and shall do all the pumping, bailing, forming of dams or other works necessary.

In effecting the drainage, the water shall not be allowed to flow over the invert of the sewer, except under special conditions for protecting the work, approved by the engineer.

Back filling (5). The work shall be back filled carefully, and packed and rammed under and around the sewer with proper tools. In refilling all the trenches, the earth shall be faithfully rammed in layers not exceeding nine inches in thickness, with rammers, weighing not less than twenty-five (25) pounds, and an area on the bottom of not exceeding sixteen (16) square inches.

Whenever any back filling is being done, there shall always be at least one man ramming, and the proportion of the number of men back filling to the number of men ramming shall never exceed three to one.

The hardening on the surface of the streets shall be carefully preserved, and replaced over the refilled trenches.

Repaving and restoring streets (6). When the pavement or surface of any street has been removed it must be replaced by the contractor and left in as good condition as it was before being removed.

All surplus material and rubbish must be removed by the contractor.

Protection against accidents (7). The contractor shall erect suitable barriers around all excavations to prevent accidents to passengers on the streets, and shall place and maintain during the night, sufficient lights on or near the work.

Cement (8). The cement shall be pure, fresh-ground, Rosendale cement, of best quality, and when used for filling the joints of the vitrified pipe sewers, only enough water shall be added to give it the proper consistence, and it shall be used as soon as mixed.

Cement mortar (9). The cement mortar to be used in building the man-holes, and for any other necessary masonry, shall be mixed in the proportion of one part, by measure, of cement to two parts, by measure, of clean, sharp sand, free from loam. The cement and sand shall be carefully mixed dry; the water afterward added, and the mortar made fresh for the work in hand. No mortar shall be used which shall be found to be weak or imperfect, either from standing too long after being mixed, or from any other cause.

Concrete (10). Concrete, when required, shall be composed of one part of cement mortar, made as before described, and two and one-half parts of clean gravel, or broken stone free from dirt, and of not more than two and one-half inches in diameter. It shall be quickly and thoroughly mixed, and immediately deposited in place, after which there shall be no walking or working over it, before it is set.

Brick masonry (11). The brick masonry shall be constructed of the best quality bricks, burned hard entirely through, regular and uniform in shape and size, and laid in cement mortar of the quality before specified.

Every brick shall be immersed in water immediately before being laid and shall have full cement joints under bottom, sides and ends, which for each brick shall be formed at one operation, and in no case shall be made by working in the mortar after the brick is laid. Every course of brick shall be laid with joints, not exceeding one-quarter of an inch for face work.

Man-holes (12). Man-holes shall be constructed of such size and at such places as the engineer may direct. They shall be of eight-inch brick work, worked up to within inches of the surface where the opening shall be two feet diameter in the clear.

Projections of iron, fifteen inches apart, to serve as steps, shall be built in the sides of the man-hole, as shown on the plans, or as directed by the engineer. The exterior surface of all man-holes shall be neatly plastered with cement mortar of the quality above described.

Vitrified pipes (13). The pipes for the eight-inch and ten-inch sewers shall be of vitrified sewer pipe, of a quality equal to the best pipe manufactured at Akron, Summit county, Ohio. They shall have socket joints and shall be homogeneous in texture, and burned hard entirely through. The area shall not be less than that of a circle of the specified diameter, and the variation in diameter shall not exceed one-half an inch. No pipe shall be used except for curves, which vary from a straight cylinder more than three-eighths of an inch in two feet.

Especial care must be taken to lay the pipe to the exact grade and line, by such means as the engineer may direct.

All pipes previous to being lowered into the trench shall be fitted together and matched, so that when jointed in the trench they may form a true and smooth line of pipes. In fitting the pipes together no means must be resorted to which shall, in the judgment of the engineer, be thought detrimental to the pipes.

Joints (14). A gasket of tarred oakum shall be pressed into the joint around the entire circumference of the vitrified pipe, to prevent the entrance of cement to the inside of the pipe. No joint shall be cemented until the gasket of the next joint in advance has been completed. Cement shall be pressed into the space between the socket and spigot so as to entirely fill the space, and the bevel joint at the end of the socket shall be smoothly and evenly made.

All iron pipe shall be jointed with lead, to a depth of not less than two inches, and such joints shall be thoroughly water-tight and completed to the satisfaction of the engineer.

An excavation must be made in the bottom of the trench for the sockets of the pipes so that these may be supported throughout their entire length.

Iron pipes (15). Iron pipes shall be cast vertically, the castings shall be truly cylindrical and the spigot of every socket pipe shall fit properly into the socket. The sectional area of every pipe shall be truly concentric, and any pipe which deviates more than one-fourth from the specified thickness must be rejected. The pipes must be furnished in twelve-feet lengths and must be seven-sixteenths of an inch in thickness. The tensile strength of the iron of which the pipes are formed shall not be less than 15,000 pounds to the square inch, and they shall be tested in a hydraulic machine to a pressure equivalent to a head of water of 400 feet.

Support for pipes crossing Brandywine creek (16). The cast-iron pipes crossing Brandywine creek above the bed of the creek shall be suitably supported by timbers and so boxed around and protected as to be secure from danger of freezing and of damage from ice during freshets.

The timbering and securing from frost shall be done in a durable and substantial manner and shall be subject to the approval of the engineer.

Protection of joints from the roots of trees (16½). Wherever the vitrified pipes pass in the neighborhood of trees the joints shall be prepared with especial care and they shall also be surrounded with concrete, wherever in the opinion of the engineer it may seem advisable, so as to effectually protect the pipes from the insinuation of roots.

Sewers and man-holes to be kept clean (17). When the trench is left for the night, or the pipe laying is stopped by rain storms or any other cause, the ends of the pipe must be closed water-tight with a plug and cement or in such other manner as the engineer may direct. Before the sewers and man-holes are accepted all earth and rubbish must be thoroughly removed from them.

Dismissal of incompetent persons (17½). If any person employed on the works by the contractor shall appear to the engineer to be incompetent or disorderly, he shall be discharged immediately on the requisition of the trustees; and such person shall not again be employed.

House connections (18). Y branches shall be placed at points indicated by the engineer. They shall be closed with an earthenware cap, and the space above the cap shall be filled with sand, covered with a thin coating of cement.

Valves (18½). Valves in the iron pipe shall be of good workmanship and accurately fitted in all their parts; they shall be suitably protected from frost, and so arranged as to be readily operated from the surface of the ground, in the usual manner of arranging such appurtenances to water pipes.

Suspension of masonry and protection from frost (19). No work in cement masonry shall be done when the thermometer is below 35° F. All unfinished masonry shall be properly protected from frost and water.

Responsibility of contractor (20). The contractor shall have charge of and be responsible for the entire line of works until their completion and acceptance, and any unfaithful or imperfect work that may be discovered at any time before the final completion and acceptance of the work embraced in this agreement shall be corrected immediately on the requirment of the engineer.

Rejected materials to be removed (21). All materials to be provided by the contractor shall be of the best description, and he shall furnish all efficient labor and implements necessary for the full and complete performance of his contract. If any materials or implements should be brought to the ground, which the engineer may deem to be of improper description, or improper to be used in the work, the same shall be removed by the contractor as soon as practicable.

Work to be prosecuted without unnecessary delay (22). If at any time the work is stopped by the insufficiency of pipe or other materials on hand, the contractor must be liable for all expenditures

For each lamp-hole complete the sum of..... $
For pen-stock in iron pipe... .....
For each Y branch in the ten-inch pipe..... cts.
For each Y branch in the eight-inch pipe..... cts.

Contract not to be assigned without permission (F). And the said part of the second part further agree that will not assign, transfer or sublet the aforesaid work, or any part thereof, without the written consent of the trustees, and that any assignment, transfer, or subletting, without the written consent of said trustees, shall in every case be absolutely void.

Provisions for payment (G). And the said part of the second part further agree that shall not be entitled to demand or receive payment for any portion of the aforesaid work or materials until the same shall be fully completed, in the manner set forth in this agreement, and such completion certified by the engineer in charge of the work, and by the inspector appointed to examine the same, and until each and every of the stipulations hereinbefore mentioned are complied with. Whereupon the parties of the first part will pay, and hereby bind themselves and their successors to pay, to the said part of the second part in cash, on the day of the month next succeeding that in which the work is done, eighty-five (85) per cent of the monthly estimate of the whole amount of money accruing to the said part of the second part under this contract: Providing that nothing herein contained be construed to affect the right hereby reserved of said trustees to reject the whole or any portion of the aforesaid work, should the said certificates be found or known to be inconsistent with the terms of this agreement or otherwise improperly given.

When the percentages retained are to be paid (H). And it is further agreed by the parties of the first part, that the remaining fifteen (15) per cent shall be paid to the said part of the second part as follows: Ten (10) per cent when the contract is completed and duly certified to, and the remaining five (5) per cent at the expiration of six months from the date of the final estimate for the whole work.

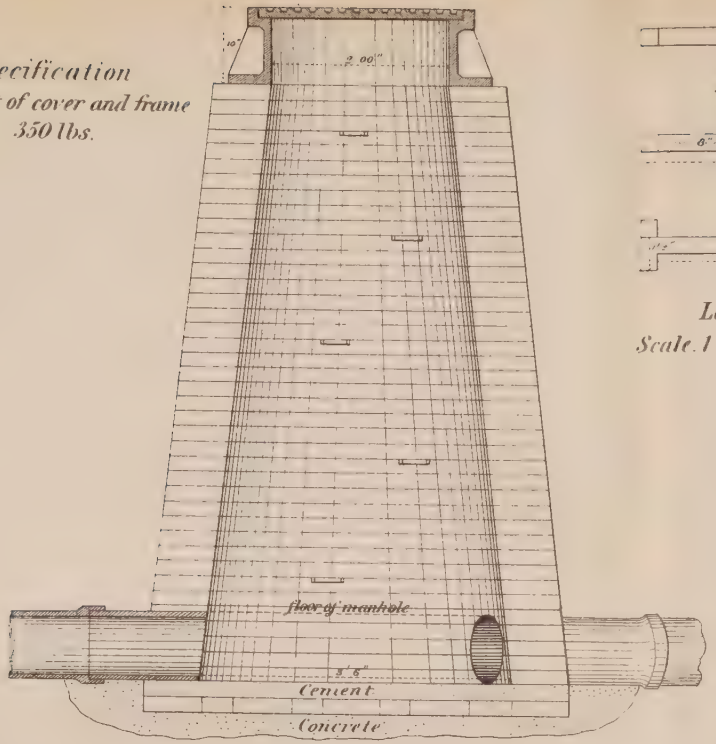
IN WITNESS WHEREOF, The parties to these presents have hereunto set their hands and seals the day and year first above written.

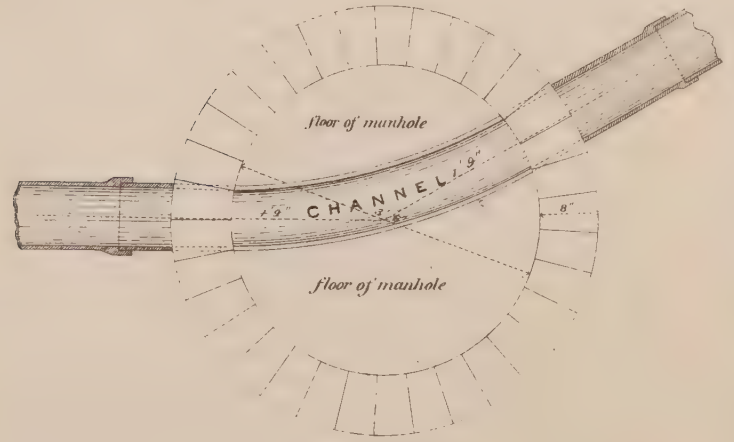
The above-named plan is hereby approved by order of the State Board of Health.

EDWARD M. MOORE, M. D.,
President.
ALFRED L. CARROLL, M. D.,
Secretary.

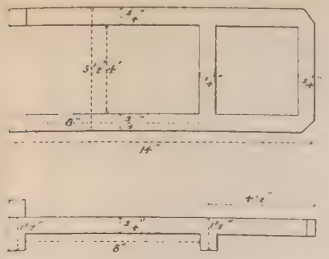
[The outfall sewer from the Asylum for the Chronic Insane at Binghamton, with branches to the new buildings, was constructed

Specification
weight of cover and frame
350 lbs.





Manhole. Scale 1 inch to 2 feet.

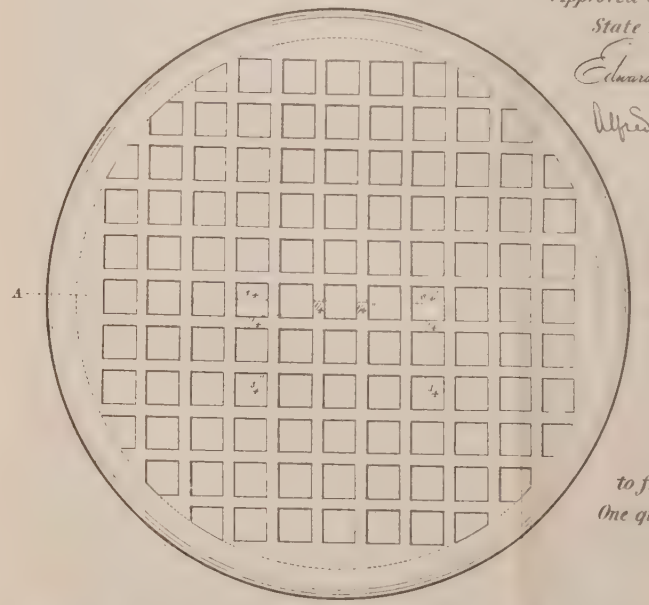


Ladder Step
Scale. 1½ inches to the foot.

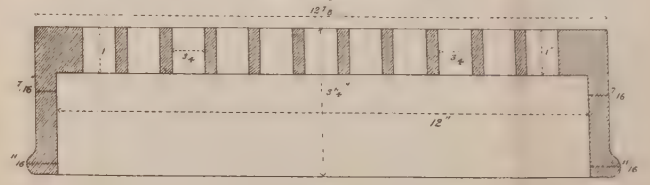
APPURTENANCES OF SEWER
FROM THE
BINGHAMTON INSANE ASYLUM

to accompany plans prepared by
HORACE ANDREWS.
JULY 1885

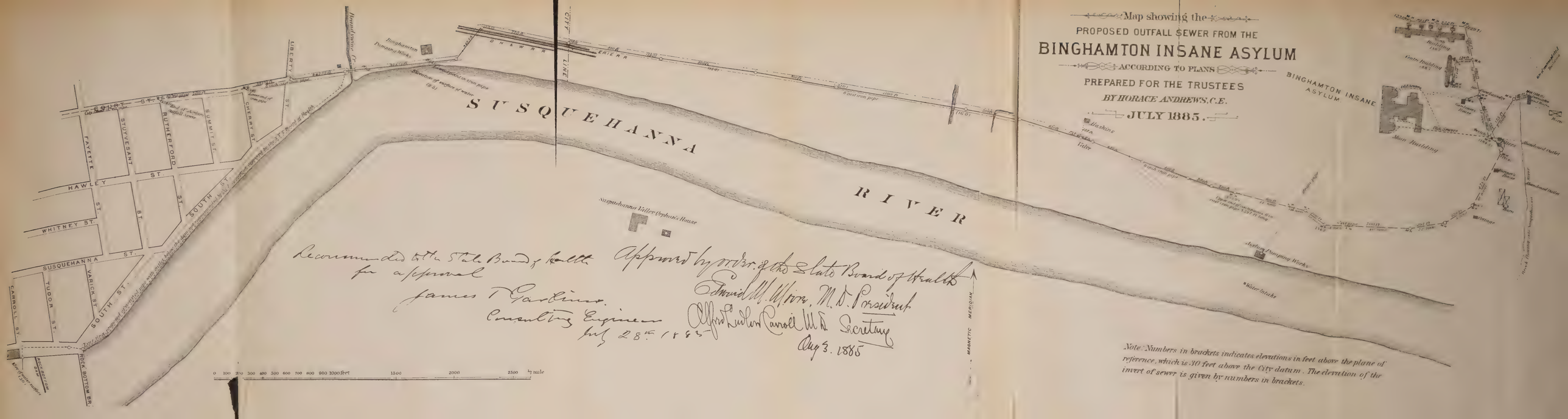
Approved by order of the
State Board of Health
Edward M Moore M.D President
Alfred Ludlow Carroll Secretary
August 3rd. 1885.



Cast Iron Screen
to fit 12" iron water pipe
One quarter natural size.



Section through A.B.


Map showing the
PROPOSED OUTFALL SEWER FROM THE
BINGHAMTON INSANE ASYLUM
ACCORDING TO PLANS
PREPARED FOR THE TRUSTEES
BY HORACE ANDREWS, C.E.
JULY 1885.
BINGHAMTON INSANE ASYLUM
SUSQUEHANNA RIVER
Binghamton Pumping Works
Susquehanna Valley Orphan's House
Recommended to the State Board of Health for approval
James T. Gardiner.
Consulting Engineer
July 28th 1885
Approved by order of the State Board of Health
Edward M. Moore, M.D. President
Alfred Ludlow Carroll M.D. Secretary
Aug 3. 1885
Note: Numbers in brackets indicates elevations in feet above the plane of reference, which is 50 feet above the City datum. The elevation of the invert of sewer is given by numbers in brackets.
MAGNETIC MERIDIAN
0 100 200 300 400 500 600 700 800 900 1000 feet 1500 2000 2500 ½ mile

substantially in accordance with the plans, as approved by the State Board of Health. The sewerage system has been in successful operation since December last.

Mr. Horace Andrews was the engineer appointed by the trustees of the asylum to prepare the plans and to supervise the work during construction. His assistant, Mr. John L. FitzGerald, personally inspected the entire work of construction in all its details. The contractor was Mr. Arthur Osborn, of Binghamton.]

REPORT UPON THE OAK HILL CEMETERY AT NYACK, ROCKLAND CO.

ALBANY, *November* 25, 1885.

To the Board of Health of Nyack:

GENTLEMEN — I have the honor to transmit herewith the report of Mr. Andrews on the condition and probable sanitary effects of the cemetery adjoining your village, a report with which I fully concur. The dangers arising from the decomposition of animal matter in burying-grounds vary with the character of the soil, but under any circumstances, the difference is rather one of degree than of kind. In porous soils, such decomposition takes place most rapidly, complete decay of the body sometimes occurring in a very few years; but these soils permit the greatest diffusion of gaseous and dissolved products. In the case under consideration, with a gravelly superficies underlaid by almost impervious strata, such wide diffusion of the rapidly-produced liquified results of putrefaction would be particularly favored, and the risk of pollution of comparatively distant sources of water supply enhanced. It has long been a matter of common experience that low fevers and various forms of "filth diseases" are apt to prevail in the neighborhood of old burying-grounds where population gathers around them; and even before these marked consequences ensue, a general depreciation of vitality and a lessened power of resisting other causes of disease is often observed.

As regards the report of Dr. Hailes, it may be remarked that although our present knowledge of the roles played by different species of bacteria is not sufficiently accurate to justify a positive statement as to the precise "diseased germs" contained in any given specimen of water, but by common consent among biologists the rapid multiplication and early liquefaction of the solidified gelatin is considered as indicating approximately the disease-producing nature of the microscopic organisms under investigation. The warning given by Mr. Andrews in relation to the ice-pond is one that should be heeded; the popular superstition that water in freezing purifies itself from organic matter is mistaken, and it is certain that a temperature far below freezing does not destroy the germs of the most virulent maladies.

I am, gentlemen, your obedient servant,

ALFRED L. CARROLL, M. D.,
Secretary.

Engineer's Report.

To the Secretary of the State Board of Health:

SIR — In accordance with your instructions, and in response to a request from the board of health of Nyack, dated October 10, 1885, I have made an examination of the Oak Hill Cemetery and its surroundings, and herewith submit my report:

SITUATION OF OAK HILL CEMETERY.

The cemetery, known as Oak Hill Cemetery, is situated partly within and partly without the corporation limits of the village of Nyack, in the extreme western part of the village, and distant about three-fourths of a mile from its central or business portion.

The land upon which the cemetery is situated slopes abruptly to the south, and more gently to the east and south-east. A small creek, flowing eastward past the cemetery and through the village, has been dammed to form an ice-pond, covering several acres and lying to the south of the sloping ground upon which the cemetery is placed. A considerable number of interments have been made within 500 feet of the shore of the ice-pond and at elevations between 60 feet and 150 feet above the level of its surface.

There are six or eight dwelling-houses between the cemetery and the ice-pond, and a number to the eastward of the cemetery. The Rockland College, a large boarding-school, also is located very near to the cemetery, and to the eastward of the same.

All of the houses mentioned, including the school, are supplied with water from wells and springs adjoining them. Many of the houses have been built for a number of years, and have till recently depended exclusively upon their wells for drinking water. The superintendent of the cemetery resides within its limits, on the southerly slope, and has for many years been supplied with water from a spring upon the property.

A number of the houses referred to, as well as the school, are now provided with water pumped from the Hackensack river, several miles to the westward, but the disagreeable and turbid appearance of this water renders its use for drinking purposes a rarity, while some of the houses have no other supply than their wells. Suitable filtering would probably render the Hackensack river water unobjectionable.

NUMBER OF INTERMENTS AND CHARACTER OF THE SOIL.

The first burial in the cemetery was in 1848. On March 17, 1865, the cemetery was incorporated, and it has shown a steady growth for a number of years, about 150 interments being made yearly at the present time. Allowing for the number of removals there are now about 4,000 bodies interred within the cemetery, as shown by the books of the company.

The act of 1865, incorporating the cemetery, fixes its size as not to exceed fifty acres in addition to the area occupied at the time of

the passage of the act. The entire area at present is estimated at thirty acres, while the interments are confined to an area of about eighteen acres.

The cemetery has recently been increased in size by an extension of nine or ten acres to the eastward of the old inclosure. The land annexed lies to the north of the Rockland College property, which is also bounded on the west by the cemetery.

There are at present no interments in the eastern annex referred to, and this land has not been improved to any great extent.

Upon the southerly slope of the cemetery the soil is composed of gravel, underlaid with hardpan, at a depth of five or six feet, and with trap-rock, which latter crops out on the surface in one or two places. In the newly-annexed portion, the land slopes more gradually, and is of a more moist and springy character than in the old portion.

Interments are usually made at a depth of five feet. In the deeper gravel near the southern limit of the cemetery, bodies seem to be entirely decomposed and to disappear after fourteen or fifteen years. The graves are well drained in all parts of the cemetery now occupied. To provide effectual drainage in the new part a small pond is to be excavated in the lower portion, the surplus water from which will be removed by drains or by evaporation.

Unsanitary Conditions.

At the present day there is, on the part of sanitary authorities, no doubt regarding the injurious effect of cemeteries upon the public health.

The pollution of water is a great and manifest evil. In the case of Oak Hill Cemetery there is good reason to believe that the water in the various wells in its vicinity has been brought into contact with the bodies of the dead, and holds organic impurities in solution. The water may not be rendered at all turbid by such organic matters and they may not affect its taste, unless present in large quantities, but chemical or biological analysis will generally reveal the truth regarding the suspected contamination.

Three samples of water accompany this report; they are all of apparent purity, but from the nature of the surroundings of the wells which furnished the water, there is great reason to apprehend that it is in every case impregnated with the liquids and soluble matters of decomposition.

Sample No. 1 is from the well of the Rockland College. This well is thirty-seven feet in depth. From its location it may be contaminated both with cemetery and privy drainage.

Sample No. 2 is from a spring of remarkable clearness about seventy feet from the north shore of the ice-pond. The surface of the water in the spring is three feet above that in the pond, and the water is three feet deep in the spring.

Sample No. 3 is from a well in the south-western part of the cemetery inclosure.

A large part of the cemetery drainage must find its way into the ice-pond. The use of ice from the pond should certainly be confined to the refrigerating operations of brewers, or to other uses where it may be kept from actual consumption by human beings.

In Paris, a law forbids the sinking of a well within 300 feet of a cemetery; in some parts of Germany the same distance is fixed as the minimum allowable, while cases are known to exist where 200 yards has proved an insufficient distance to guard against contamination.

Under ordinary circumstances water contaminated with decaying substances will merely have the effect of lowering the vital powers and of increasing susceptibility to disease, but water contaminated with drainage from the bodies of the dead may be loaded with specific poisons and with the germs of disease. Instances are recorded where the use of such water has occasioned frightful epidemics.

The gaseous products of decomposition may readily be drawn into houses adjoining a cemetery, especially during the winter when the ground is frozen on the surface. The artificial heat within dwelling-houses then tends to create a suction and in-draught of air from the sub-soil. The soil of a graveyard has been known to be so completely filled with carbonic acid and other gaseous products of decay that the heavier gases accumulated in newly-made graves with such rapidity as to endanger the lives of those employed to dig them.

The fœtid air exhaled from graves, even when dissipated by the wind, may lower the vital powers of those daily exposed to its influence.

It is, therefore, strongly to be desired that the mouldering remains of the dead should be removed as far as possible from dwelling-houses. The congress of hygiene at Brussels recommended that an interval of at least a quarter of a mile should separate a cemetery from any habitation.

The further extension of Oak Hill Cemetery must be deplored on sanitary grounds; it is now much too close to many dwelling-houses for the safety of their occupants, while the continual addition to the number of those buried within its limits gives assurance that the water and the air are daily receiving new burdens of decay.

The interests of health demand that cemeteries shall be placed at remote distances from dwellings and that their use be promptly discontinued whenever it is discovered that the abodes of the living are crowding upon those of the dead.

The forces of nature will at length cleanse the soil of graveyards and the atmosphere around them, if the decomposing matter is not continually replenished. It is wise to look to the future, anticipating the growth of villages and cities by gradually discontinuing the use of cemeteries near their limits. The growth of vegetation in such abandoned burial places will eventually purify them so that, maintained as public parks, they may become conducive to health and beneficial to adjoining property.

Very respectfully yours,

HORACE ANDREWS,

ALBANY, *November* 2, 1885. *Civil Engineer.*

Water Analysis.

ALBANY, *November* 11, 1885.

Dr. A. L. CARROLL:

DEAR SIR — Upon biological analysis of specimens of water sent to me from Nyack, N. Y., Nov. 1, 1885, collected by H. Andrews, I report as follows:

LOCALITY	Date of culture.	Time of first appearance of micro-organisms.	Time of beginning of liquefaction of gelatine.	Extent of liquefaction of gelatine in five days.	Observations.	Parts of chlorine in 100,000.
No. 1. Well water, Rockland Seminary..	Nov. 2..	36 hours..	3d day..	Entirely destroyed	The colonies of bacteria were very numerous; developed rapidly and liquefied the gelatine very quickly and consumed the whole mass.....	1
No. 2. Spring water, near ice pond.....	Nov. 2..	36 hours..	3d day..	Entirely destroyed	The colonies of bacteria were very numerous; developed rapidly, and liquefied the gelatine very quickly and consumed the whole mass.....	1.10
No. 3. Well water, near barn, Oak Hill Cemetery	Nov. 2..	36 hours..	3d day..	Entirely destroyed	The colonies of bacteria were very numerous; developed rapidly, and liquefied the gelatine very quickly and consumed the whole mass.....	1.15

POTABLE WATER SUPPLY.

The following law was passed by the Legislature in the interest of many localities suffering from the pollution of the sources from which they derived their potable water supplies, by parties living beyond the jurisdiction of the localities affected:

AN ACT to confer upon the State Board of Health power to protect from contamination, by suitable regulations, the water supplies of the State and their sources. Passed June 13, 1885; chapter 543, Laws of 1885.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. The State Board of Health is hereby authorized and empowered to make rules and regulations for protecting from contamination any and all public supplies of potable waters and their sources within this State. Provided, however, any such rule or regulation shall not be operative in any county until the county judge of that county shall approve the same.

§ 2. The said State Board of Health shall also have power, and it shall be its duty: 1. To publish once a week, for at least six consecutive weeks, all such rules and regulations as it shall have made concerning the contamination of any sub-soil waters, springs, streams, lakes, ponds, reservoirs, or other bodies of water contributing to the potable water supply of any municipality within this State, such publication to be made in one or more newspapers published in the county in which the waters affected by such regulations are located. The cost of publishing the regulations of the State Board of Health, as above provided, shall be paid by the corporation or municipality benefited by the protection of the water supply, concerning which the rules are made. 2. To impose penalties for the violation of, or the non-compliance with, their rules and regulations, not exceeding two hundred dollars in any one case.

§ 3. The officer or board having by law the management and control of the potable water supply of any municipality, in all cases where the said municipality derives its water supply in whole or in part from any sub-soil water springs, streams, lakes, ponds, reservoirs, or other waters concerning which the State Board of Health shall make any rule or regulation, is hereby authorized and empowered to make such inspection of the sources of said water supply as said officer or board may deem advisable to secure the said water supply from any defilement, and to ascertain whether or not the rules and regulations made by the State Board of Health are complied with.

§ 4. In case such inspection shall disclose the violation by any person or persons of any of the rules or regulations of the said State Board of Health relating to the sources of said water supply, the officer or board mentioned in section three of this act shall serve or cause to be served a copy of the said rules and regulations, accompanied by a notice specifying the rule or regulation claimed to have been violated, upon the said person or persons violating such rules or regulations. If the person or persons so served do not immediately comply with the said regulation, the said officer or board having charge of the water supply of the municipality affected thereby shall notify the State Board of Health of the violation of its rules;

the State Board of Health shall thereupon examine into the said violation, and if the party complained of is found to have actually violated any of the said regulations, the Secretary of the State Board of Health shall order the local board of health having jurisdiction thereof to convene and enforce obedience to the said regulation.

§ 5. In case any local board of health having jurisdiction thereof fails to enforce the order of the Secretary of the State Board of Health within ten days after the receipt of a notification so to do, as provided in the last section, the corporation furnishing the water supply, or the municipality deriving its water supply from the waters for the sanitary protection of which such rules have been made, is hereby authorized and empowered to maintain an action in a court of record and which shall be tried in the county in which the cause of action arose against the person or persons violating the said rules for recovery of the penalty therein provided.

§ 6. Every person who shall willfully violate or refuse to obey any rule or regulation made and published by the State Board of Health, and approved pursuant to the provisions of this act, shall be guilty of a misdemeanor, and on a conviction thereof shall be subject to a fine or imprisonment, or both, at the discretion of the court, such fine not to exceed three hundred dollars, nor such imprisonment six months. But the recovery of a penalty in a civil action, as provided in section five of this act, and criminal prosecution and conviction under the provisions of this section, shall not be had for the same offense.

§ 7. When the State Board of Health shall, for the protection of a water supply from contamination, make regulations, the execution of which will require the providing of some public means of removal or purification of sewage, the municipality or corporation owning the water-works benefited thereby shall, at its own expense, construct and maintain such works or means for sewage disposal, as shall be approved by the State Board of Health.

§ 8. The State Board of Health, any local board of health, or any municipality or corporation furnishing water, may cause the affidavit of the printer, publisher, or proprietor of any newspaper publishing the rules and regulations as provided by the second section of this act, to be filed with such rules as published in the clerk's office of the county in which the municipality or corporation furnishing the water supply in any case may be situated or located, and such affidavit and rules, or duly certified copies thereof, shall be deemed conclusive evidence of due publication and of all the facts therein stated in all courts and in all proceedings or prosecutions under the provisions of this act.

§ 9. All acts or parts of acts inconsistent with the provisions of this act are hereby repealed.

§ 10. This act shall take effect immediately.

Under the above act, rules and regulations have been made as hereinafter specified:

RULES AND REGULATIONS FOR THE SANITARY PROTECTION OF THE WATERS OF HEMLOCK LAKE, THE PUBLIC POTABLE WATER SUPPLY OF THE CITY OF ROCHESTER.

Privies adjacent to the Lake.

RULE I.

Section A. All houses, cottages, tenements, tents, camp and pic-nic grounds, adjacent to the shores of Hemlock lake, shall be provided with, at least, one privy, which shall be placed upon the ground, without any vault beneath it, and shall be so constructed that metallic pails, fifteen inches high by fourteen inches in diameter, can be placed under the seats and be frequently and easily removed with their contents.

Section B. The privies shall be so located that access to them from the lake may be had, for the purpose of facilitating the removal of the pails.

Section C. Occupants of the premises should daily add earth or ashes to the contents of the pails, as a deodorizer and absorbent.

Section D. The owners and occupants shall also exercise due care and oversight of the pails used in the privies.

Section E. When any privy is to be used in winter as well as summer it shall be so located and arranged that the pail may be replaced by a water-tight box or trough resting on solid runners or small wheels, and having a staple by which it may be drawn out from under the seat, or be otherwise so arranged that when the box is sufficiently filled, it may be taken from under the privy and the contents emptied in some safe place, where they cannot possibly be washed into the lake or into any stream running into the lake, or into any well or spring. Ashes should daily be thrown into the privy box as a deodorizer.

Section F. No owner or occupant shall have upon their premises any privy vault of any kind situated within two hundred feet of the shore of Hemlock lake.

RULE II.

Section A. The city of Rochester shall furnish a sufficient number of pails, for the use of each privy situated within two hundred feet of the shore of Hemlock lake, and shall cause the pails to be placed under the seats, and to be removed, emptied, cleansed and disinfected as often as may be necessary to insure that they are kept in good sanitary condition.

Section B. When a full pail is removed from a privy, its place shall be immediately supplied by an empty one.

Section C. The pails shall be made of metal, and shall be fifteen inches high by fourteen inches in diameter, outside measurement. They shall be provided with covers, to be used during removal.

Section D. The removal of the pails from the privies shall be conducted in such a manner as to cause as little inconvenience or annoyance to the occupants of the premises as is compatible with proper management of the business.

Section E. The contents of the pails shall be removed by the city of Rochester to some point below the foot of the lake, and be so treated and disposed of as to cause no nuisance nor danger to the public health.

Privies near Streams, Springs or Water-courses on Hemlock Lake Water-shed.

Rule III.

Section A. No privy shall be located within thirty feet of any stream, spring or dry water-course, the water from which, when running, empties eventually into Hemlock lake.

Rule IV.

Section A. Any privy situated within fifty feet of any stream, spring or dry water-course, on the water-shed of Hemlock lake, or within fifty feet of the bank of any ravine on this water-shed shall be constructed without a vault, and shall have under the seats half barrels, tubs, pails, or water-tight boxes or troughs arranged to be easily and frequently removed, emptied, cleansed and returned to their place, under the privy seats. Ashes or dry earth should daily be used in these privies as a deodorizer and absorbent.

Rule V.

Section A. The owners or occupants of premises having privies with tubs, pails or boxes, shall cause the contents to be removed and the receptacle to be cleaned as often as is necessary to keep the privy in good sanitary condition.

Section B. The contents of the said privies shall be disposed of in such a manner that they can by no possibility be washed into any stream, dry water-course, ravine, spring or well, either over the surface or through the sub-soil, and the excremental matter shall be so placed as not to cause an offensive nuisance.

Rule VI.

Section A. If, owing to the porous character of the soil, the height and flow of the surface or sub-soil waters, the steepness of the slopes, or other conditions of the locality, it shall be the judgment of the local board of health, or of the State Board, that the excremental matter from any privy may be washed on the surface or through the soil into some neighboring spring or water-course, then, after due notice to the owners or occupants of these premises, their privy shall be made to conform to the rules governing privies, situated within fifty feet of water-courses.

Garbage.

Rule VII.

Section A. The owners or occupants of all houses, cottages, tenements, tents, camp and pic-nic grounds, within two hundred feet of

Hemlock lake, shall place all garbage produced on their premises in such receptacles as may be provided therefor by the city of Rochester.

Section B. No garbage shall be thrown into the lake, or upon the ground within two hundred feet of the lake, nor shall it be thrown upon any spot where it may possibly be washed into the lake.

RULE VIII.

Section A. The city of Rochester shall provide proper receptacles for receiving the garbage produced on all premises within two hundred feet of Hemlock lake, and shall cause the same to be removed and emptied as often as may be necessary.

RULE IX.

Section A. All house slops, and sink and laundry water, produced on premises adjacent to Hemlock lake, shall be thrown upon the surface of the ground, and distributed so as to prevent concentration and saturation at one spot, but no such polluted water shall be thrown upon the ground within one hundred feet of the lake shore, or as near that limit as the depth of the lot will permit, nor into, nor near any spring, water-course or ravine.

RULE X.

No garbage or house slops, sink or laundry water shall be discharged into any stream, spring or dry water-course, on any part of the water-shed of Hemlock lake, nor shall any such putrescible or polluted waters be thrown upon the ground or into it, where they may pollute any spring, stream or water-course on this water-shed.

Animal Manures

RULE XI.

Section A. All stables situated within two hundred feet of Hemlock lake shall be provided by their owners or occupants with a tight and well-covered bin or box, in which all manure shall be placed, and from which it shall be removed as often as cleanliness may require.

RULE XII.

Section A. No stable, pig-sty, hen-house, barn-yard, hog-yard, hitching or standing place for horses, or other place where animal manure accumulates, shall be so constructed or located that the manure from it may wash into the lake or into any stream, spring or dry water-course running into the lake.

Manufacturing Waste.

RULE XIII.

Section A. No waste products, putrescible matters or polluted waters from any slaughter-houses, cheese factories, wine or beer

vaults, cider-mills, tanneries, saw-mills or other manufactories shall be allowed to drain or wash into any stream, spring or dry water-course, or any part of Hemlock lake water-shed, or into the lake.

Animal and Vegetable Matters.

RULE XIV.

Section A. No dead animal, bird or fish, nor any filthy or impure matter, nor any decayed fruit, vegetable substances, leaves, saw-dust, roots, branches or trunks of trees in any condition of their growth or decay shall be thrown into Hemlock lake, or so placed by any person that they shall wash into the lake, nor shall they be thrown into any spring, stream or water-course running into the lake.

Washing Sheep or Animals.

RULE XV.

Section A. No sheep or other animals shall be washed in Hemlock lake, or in any influent stream within half a mile of the lake, nor shall any diseased sheep be washed in any spring, pond or stream on the water-shed of Hemlock lake.

RULE XVI.

Section A. In accordance with chapter 543 of the Laws of 1885, a penalty of $50 is hereby imposed upon any person or persons guilty of violation of or non compliance with any of the above given mandatory rules or regulations, to be recovered under said act.

Approved by order of the State Board of Health.

EDWARD M. MOORE, M. D.,
President,
ALFRED L. CARROLL, M. D.,
ALBANY, *July* 23, 1885. *Secretary.*

Approved *August* 3, 1885.

FRANK RICE,
Ontario County Judge.

RULES AND REGULATIONS FOR THE SANITARY PROTECTION OF THE WATERS OF THE WEST BRANCH OF CANADAWAY CREEK, THE PUBLIC POTABLE WATER SUPPLY OF THE VILLAGE OF FREDONIA, N. Y.

Privies near Streams, Springs or Water-courses.

RULE I.

No privy shall be located within thirty feet of any stream, spring or dry water-course, the water from which, when running, empties eventually into the west branch of Canadaway creek above the reservoir of the Fredonia water-works.

RULE II.

Any privy situated within fifty feet of any stream, spring or dry water-course, on the water-shed of the west branch of Canadaway creek above the reservoir, or within fifty feet of the bank of any ravine on this water-shed, shall be constructed without a vault and shall have under the seats half barrels, tubs, pails, or water-tight boxes or troughs arranged to be easily and frequently removed, emptied, cleaned and returned to their place, under the privy seats. Ashes or dry earth should daily be used in these privies as a deodorizer and absorbent.

RULE III.

Section A. The owners or occupants of premises having privies with tubs, pails or boxes shall cause the contents to be removed and the receptacle to be cleansed as often as is necessary to keep the privy in a good sanitary condition.

Section B. The contents of the said privies shall be disposed of in such a manner that they can, by no possibility, be washed into any stream, dry water-course, ravine, spring or well, either over the surface or through the sub-soil, and the excremental matter shall be so placed as not to cause an offensive nuisance.

RULE IV.

If, owing to the porous character of the soil, the height and flow of the surface or sub-soil waters, the steepness of the slopes, or other conditions of the locality, it shall be the judgment of the local board of health, or of the State Board, that the excremental matter from any privy may be washed on the surface or through the soil into some neighboring spring or water-course, then, after due notice to the owners or occupants of these premises, their privy shall be made to conform to the rules governing privies situated within fifty feet of water-courses.

Garbage and House Slops.

RULE V.

No garbage or house slops, sink or laundry water shall be thrown or discharged into any stream, spring or dry water-course on any part of the water-shed of the west branch of Canadaway creek above the reservoir, nor shall any such putrescible or polluted waters be thrown upon the ground or into it, where they may pollute any spring, stream or water-course on this water-shed.

Animal Manures.

RULE VI.

No stable, pig-sty, hen-house, barn-yard, hog-yard, hitching or standing place for horses, or other place where animal manure accumulates, shall be so constructed or located that the manure from it

may wash into the said creek or into any stream, spring or dry water-course, running into it above the reservoir.

Manufacturing Waste.

RULE VII.

No waste products, putrescible matter or polluted waters, from any slaughter-houses, cheese factories, wine or beer vaults, cider-mills, tanneries, saw-mills or other manufactories, shall be allowed to drain or wash into any stream, spring or dry water-course on any part of the water-shed of the said creek above the reservoir.

Animal and Vegetable Matters.

RULE VIII.

No dead animal, bird or fish, nor any filthy nor impure matter, nor any decayed fruit, vegetable substances, leaves, saw-dust, roots, branches or trunks of trees in any condition of their growth or decay, shall be thrown into the said creek or into the reservoir, or so placed by any person that they shall wash into the stream or reservoir nor shall they be thrown into any spring, stream or water-course running into the creek above the reservoir.

Washing Sheep or Animals.

RULE IX.

No sheep or other animals shall be washed in west Canadaway creek or in any branch thereof above the reservoir.

The Reservoir.

RULE X.

The authorities in charge of the water-works shall as far as practicable keep the reservoir free from accumulations of vegetable matter and shall prevent the accumulation of decaying vegetable matter and animal manure on the hill slopes from which such matter may be washed directly into the reservoir.

RULE XI.

Section A. In accordance with chapter 543 of the Laws of 1885 a penalty of $50 is hereby imposed upon any person or persons guilty of violation of, or non-compliance with, any of the above given mandatory rules or regulations; to be recovered under said act.

Approved by order of the State Board of Health.

EDWARD M. MOORE, M. D.,
President,

ALFRED L. CARROLL, M. D.,
Secretary.

REPORT UPON THE SANITARY CONDITION OF THE TOWN OF HARRISON, WESTCHESTER COUNTY.

To the Chairman of the Committee on Sewerage, Drainage and Topography of the New York State Board of Health:

SIR — I herewith submit the following report respecting the cause of complaint made by parties residing in the town of Harrison, Westchester county.

For the past few years the department of public works of the city of New York has been negotiating for land and has constructed the works necessary to supply the extreme northern part of said city with water. As a part of the plan adopted the two Rye ponds or lakes, forming a portion of the northern boundary of the town of Harrison, are to be used as a storage reservoir. The elevation of the surface of these lakes, which are said to be quite deep, is about 300 feet above mean tide. The department of public works had several laws passed to enable it to legally obtain control of the necessary land and water rights; had a commissioner appointed to appraise the value of such lands and paid all claims for land and damages before beginning the excavation of said works, so there can be no doubt but that the dealing of the city with the land-owners has been fair and legal, and that all property taken has been well paid for.

The department of public works has constructed a dam of earth and masonry at the outlet of Little Rye lake to enable it to raise and lower the water through a range of 16.6 feet, as allowed by law, and has purchased sufficient land around the lakes to allow of raising the water 3.5 feet higher. This dam was constructed last year, work being continued until the latter part of December, when it was closed, owing to severe weather. It was the necessary changes of level of these lakes during the construction of this dam and the causeway at the foot of the larger lake that produced the malaria complained of. The larger lake was raised until the flat land at the east end and at one or more places on the south side were overflowed.

It was found necessary to draw the lake down in June, leaving the recently covered flats, which formerly had been covered with trees, brush and grass, now dead or dying, owing to the action of water, exposed to the hot sun for some time, when the lake was allowed to fill, only to be again drawn down in the hot weather of September. As a result, the action of the sun on the decomposing vegetable matter filled the air with malarial poison, and the people to the number of one hundred or more, living on the east and south sides of said lakes, who had previously experienced no such malady, were stricken with miasmal disease in the forms of ague, low fever and dysentery.

A dread of a recurrence this year of the causes leading to this scourge led to the complaint made.

There are few residents north of the lakes within a mile, and they are cut off by quite a high rocky ridge. The majority live to the east and south of said lakes, many of those suffering from this source of malaria living over the line in the State of Connecticut, which, as

inclosed sketch shows, lies near the east end of Big Rye lake. All families residing within a mile of these lakes on the east and south sides of the same were in part or wholly affected with malaria. These people are for the most part highly respectable, many of them Quakers, and nearly all owning valuable real estate. The average assessment value of the land in the town of Harrison, which contains no villages, is over $100 per acre, at least one-half of which is owing to the desirability of the locality for the residences of the people doing business in New York city. Should this source of malaria be maintained it will detract largely from the value of land for suburban residences. These lakes formerly were not only very attractive but desirable places of resort, and the experiences of last year detract very much from its reputation as a healthy locality.

The soil is a sandy loam, with frequent outcroppings of rocks. The topography surrounding the lake basins is such that the fluctuating surface of the lakes within the limit given above will have no appreciable effect on the sub-soil water of the region. As will be seen from the sketch the summit of the water-shed to the south is very near the lakes, which are largely maintained by springs, the main supply being from melting snow and rains. At present the lakes are not drawn from and the water is about 2.8 feet below the spillway in the dam, so it is very doubtful if the lakes will rise to the legally authorized level this season.

On the flats between the lakes and at the east end the water at present is about two or three feet deep, while the tops of old brush, weeds, etc., rise above the surface.

REMEDY SUGGESTED.

I was informed, although not officially, that it is proposed to clean these flats of the vegetation this season. In my judgment, the interest of the consumers of this water demands that these flats be denuded of all the old turf to a depth of a foot or more in some swampy places; that the brush and stumps be removed and the banks maintained in a good sanitary condition. This would, in my opinion, remove largely, if not altogether, the cause of this complaint.

If, besides this, the department of public works would delay drawing the water down in the reservoir until late in the season, say October 1st, the cooler weather of that season would render the effect of the exposed flats (shown on sketch in red tints) less deleterious to the public health.

Respectfully submitted,

April 16, 1885. O. S. WILSON, *C. E.*

REPORT OF COMMITTEE.

STATE BOARD OF HEALTH OF NEW YORK,
ALBANY, *June* 25, 1885.

To the Board of Health Town of Harrison, Westchester Co., N. Y.:

GENTLEMEN — In response to your petition requesting the State Board of Health to examine the sanitary condition of the town as

affected by the alternate rising and lowering of the waters of Rye lake by the department of public works of the city of New York, Mr. O. S. Wilson was sent to make a careful inspection of the lake and its surroundings. A copy of his report is herewith transmitted. It appears that the city of New York have by direct legislative enactment procured the right to raise and lower the water at Rye lake through a range of 16.6 feet, and that in accordance with the act by which they have acquired this right a commission was appointed to determine the damage to the surrounding property from such action on the part of the city of New York; that the damages were determined by the commission and the full amounts paid. In the process of construction of the dam or dams at this lake last year the low lands, which were covered with a heavy growth of grass and vegetation, were twice covered with water, and twice the water was drawn down exposing these previously submerged lands with their decaying vegetation to the hot sun.

This was done once in June and once in September, and shortly after the exposure of these saturated lands to the action of the sun, it appears that two very serious outbreaks of malarial fever occurred. Such outbreaks of malaria have previously been unknown in this region according to the statements of the physicians of the town. It seems, therefore, more than probable that the fevers were due to the flooding of lands thickly covered with vegetation, causing the death of the plants which, on the drawing down of the water, decayed rapidly when exposed to the action of the sun.

Since the Legislature has given the city of New York by special statute the right to raise and lower this lake the State Board of Health has probably no power to prevent it. But the danger to health from this procedure can be very much lessened if the city of New York will thoroughly clean the vegetation and vegetable mould from the banks and bottom of the reservoir at least to low-water mark. This treatment of the pond bottom will not only be conducive to the health of the people, of the neighboring town, but will undoubtedly improve the quality of the water which is supplied to the city from Rye lake. It is not safe to allow this decomposing vegetable matter to remain in a reservoir, and our inspector was unofficially informed that the city intends to clean the reservoir as soon as practicable.

It is earnestly hoped that nothing will prevent the city authorities from carrying out this plan at an early day, since it is essential to the health of the people of the city of New York who drink the river water of Bronks and to that of the people who reside in the vicinity of the pond.

On behalf of the Board,

ERASTUS BROOKS,

Chairman Committee on Drainage, Sewerage and Topography.

Report on the Pollution of the Water Supply of the Village of Cortland.

To the Committee on Drainage, Sewerage and Topography:

Gentlemen — In accordance with instructions from the committee I visited Cortland on the 17th of September, and having made arrangements with Mr. B. F. Taylor, president of the Cortland Water Company, I visited with him on the 18th, a large spring from which the village of Cortland derives its public water supply.

This spring is situated about a mile from the village. It is of remarkable size and volume. The spring or basin containing a number of springs is some four hundred and fifty feet long and from forty to sixty feet broad. The water is seen bubbling up from the bottom in many places and is also running in from under the banks.

A dam with waste-weir has been placed along the lower end of this spring or basin. The water is pumped from above the dam to the reservoir on a neighboring hill from which it runs into the village of Cortland.

At the time of my visit the pumps were not working, so that the total volume of water delivered by the springs was flowing over the waste-weir. The supply seemed ample for a population larger than that of Cortland, which is now over 7,000.

The water-works were built by an incorporated company called the Cortland Water-Works Company which furnishes water to the village under a contract made with the authorities. The greater part of the spring basin belongs to the water-works company, but a small portion of it is on the land of Mr. Fairchild. That part of the basin belonging to the water company has been thoroughly cleared out, leaving a perfectly clean bottom, and the sides have been walled in a very creditable manner.

A small part of the basin on the property of Mr. Fairchild contains a number of springs. This part of the basin is not clean or properly protected from pollution. The bottom and shores are partly covered with muck, decaying wood lies either in the waters or close to the water's edge, a part of the border is in a swampy condition, and animal manure is both in the water and immediately on the shore in considerable quantities. The lot on which this spring is situated is used as pasture for from ten to fourteen head of cattle. They come to this spring to drink, trample up the muck on the borders and the bottom of the spring, and their droppings often fall either into the water or on to the immediate shore, where they may readily pollute the spring.

It is at once evident to anybody visiting the spring that there is quite a large amount of animal and vegetable matter in the spring and on its borders, the decay of which pollutes the water to a greater or less extent.

The water of this part of the spring flows directly down the basin and in about three hundred feet enters the pipes of the water-works company. The perfect cleanliness of that part of the basin belong-

ing to the water-works company makes the defilement of that part on Mr. Fairchild's property most evident and disgusting. That the spring is polluted is apparent to the most casual observer. This state of things is injuring the public health of Cortland in two ways: The pollution of the water with decaying wood and leaves, with muck into which cattle are constantly tramping with manure, and with manure and urine as well as with constantly decaying aquatic vegetation which is fostered by those conditions; such pollution, I repeat, undoubtedly contaminates the water and injures it, from a sanitary point of view, for public use in the village of Cortland. But conditions which are so repulsive to the senses and so evident to any one visiting the spot have such an effect on the minds of the people that hundreds are doubtless deterred from taking water from the public water supply and continue to drink well water, which is of very doubtful purity in the village of Cortland.

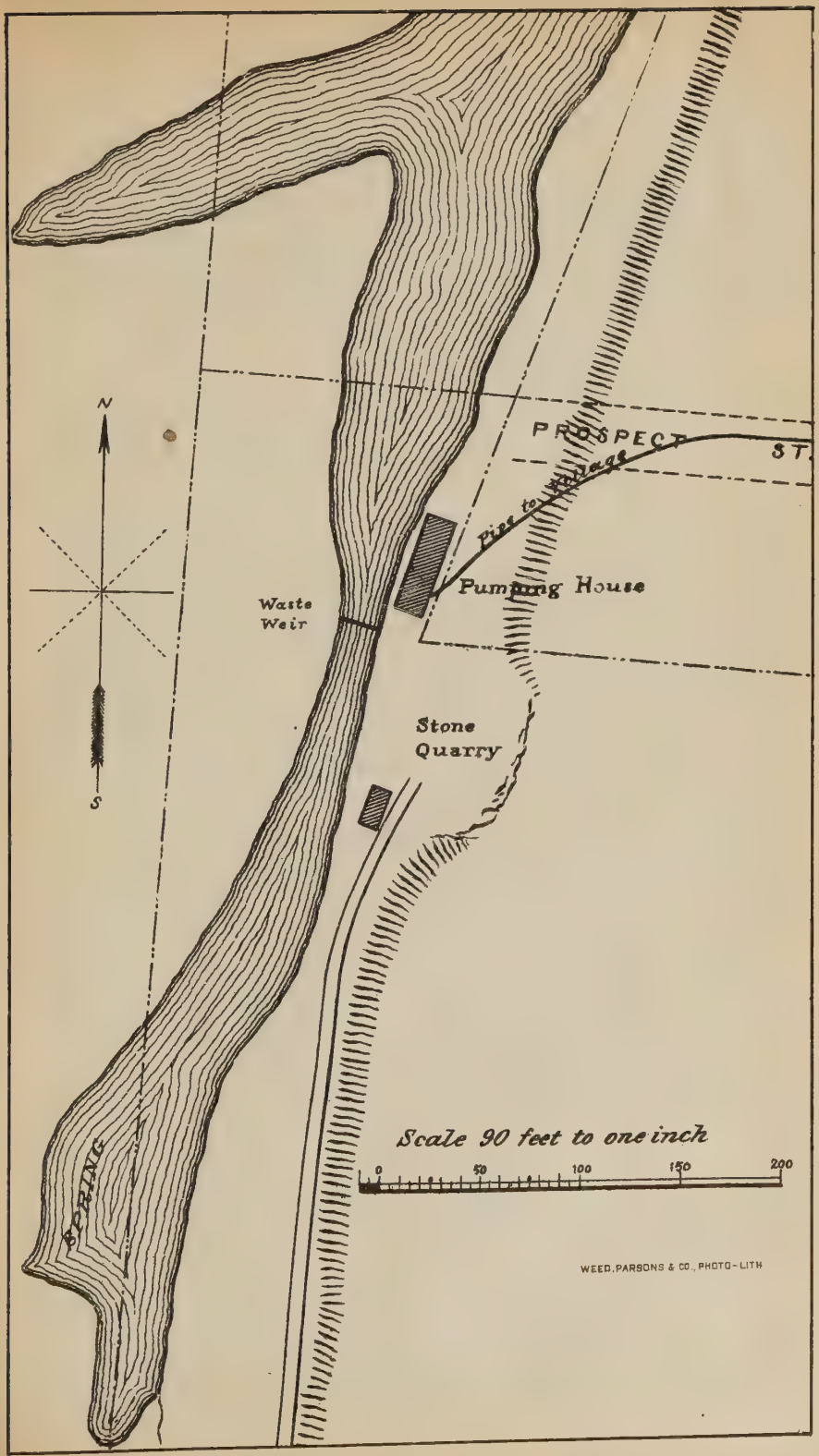
The pollution of the stream is thus acting as a source of injury to the health of the citizens of Cortland, by causing many of them to continue to drink from contaminated wells when if the springs were kept pure they would undoubtedly prefer the public water supply.

For these two reasons — first, because of the actual pollution of the water, and secondly, because many are influenced to continue to drink well water, by reason of the repulsive character of the pollution — the condition of the spring on the property of Mr. Fairchild is in my judgment a nuisance detrimental to the health and lives of the citizens of Cortland.

It does not appear to be in any way necessary for the enjoyment by Mr. Fairchild of the use of his pasture that this spring should be kept in its present foul condition. Four hundred feet from the spring above spoken of is another spring in the same pasture, at which cattle can easily drink; and the president of the water company informs me that the company have offered to put up a watering trough near the present spring to keep it perpetually supplied by a small pipe from the pumps of the water-works company. Such an arrangement was made with the owner of the other half of the spring, and I saw the watering trough which they had built and it seems to be answering every purpose for the watering of cattle in the adjoining pasture.

In order that the spring which supplies Cortland with water shall be kept in perfect sanitary condition it will doubtless be necessary that the water-works company should obtain the right to clean and protect from defilement the immediate banks of the spring from which decaying matter may be washed into the basin.

The public then can hold the water company responsible for maintaining the purity of the supply. The water-works company allege that they have endeavored to purchase this right or rather to purchase so much of the land about the spring as is necessary to secure this privilege, and that the owner refuses to make any reasonable terms for the land.


N
S
PROSPECT ST.
Pipe to Village
Pumping House
Waste Weir
Stone Quarry
SPRING
Scale 90 feet to one inch
0
50
100
150
200
WEED, PARSONS & CO., PHOTO-LITH

The difference between these parties as to terms should not be allowed to be a source of serious injury to the public health of the village of Cortland. Rather than allow the continuance of the present condition of things it seems desirable that in the interest of the public health a judicial determination of the value of this property should be made as speedily as possible and the existing nuisance abated.

Very respectfully,
JAMES T. GARDINER,
Consulting Engineer.

Report of the Committee on Drainage, Sewerage and Topography.

A petition having been forwarded by a number of citizens of the village of Cortland, complaining that a spring which furnishes the public water supply was being contaminated, and asking for an abatement of the nuisance, Consulting Engineer Gardiner was directed to make an examination and to report the condition of the water supply and to make such recommendations as the conditione seemed to require. On the 17th and 18th he visited Cortland, and his report is herewith appended with the approval of the committee.

It appears that the source of the water supply of Cortland is from a basin some four hundred and fifty feet long, containing a large number of springs; that the greater part of this is on land belonging to the water-works company, while a small portion belongs to a private owner, with whom the company have not been able to come to terms as regards purchase; that part of the spring which is the property of the water-works company has been thoroughly cleaned and protected from defilement on the banks; and that the part which is the property of a private owner is polluted with decaying wood, muck and animal manure. It is the drinking and standing place for from ten to fourteen head of cattle. The spring is, therefore, defiled with both animal and vegetable matters. The evident and offensive character of this pollution acts in two ways to the injury of the public health of Cortland. It actually contaminates the water, and being a matter of public notoriety, it so affects the mind of the people that great numbers are deterred from taking the public water supply and forced to continue drinking from wells, many of which are doubtless polluted.

This state of things undoubtedly makes the condition of the spring on Mr. Fairchild's property a nuisance dangerous to the health and life of the people of Cortland. We, therefore, recommend that the condition of that part of the spring situated on Mr. Fairchild's property, the water from which flows into the public water supply of the village of Cortland, be declared a nuisance.

We further recommend that in order that the public may be able to hold the water-works company responsible for the purity of the supply, that the water-works company should acquire the right to

clean and protect from pollution the spring and its immediate banks, and that in case the parties in interest are not able to agree upon terms for the acquiring of this right, that in the interest of the public health a judicial determination of its value should be made as speedily as possible.

ERASTUS BROOKS,
Chairman, Committee.

At a meeting of the State Board of Health on September 24th, at Albany, the above report was presented, and, on motion, adopted by the Board, its recommendations approved and a copy ordered transmitted to the parties interested.

ALFRED L. CARROLL, M. D.,
Secretary.

REPORT

ON THE

PRACTICAL OPERATION OF THE SEPARATE SYSTEM OF SEWERS.

The experience of the committee on drainage, sewerage and topography of the State Board of Health, during the past two years, has shown that the great obstacle to the introduction of sewerage systems into the villages and smaller cities of the State is the anticipated cost. While there are localities in many of the villages which at certain seasons suffer from accumulations of storm-water upon the surface, the evils arising from this source are as nothing compared with those that are due to the accumulations of sewage, including excremental matter and slops in the privies, cess-pools and gutters about the dwellings.

The sanitary problem usually presented is, to provide some cheap and effective method of carrying away the sewage proper from the villages, and disposing of it in such a way as not to create a nuisance. In other words, the accumulation of filth in the ground and on the ground around the dwellings of people must, if possible, be prevented. In the experience of the State Board of Health, the cheapest effective way of accomplishing this purpose is usually by the separate system of sewerage combined with subsoil drains for drying the cellars and sub-soil.

While the separate system of sewerage has many advantages from the economical and sanitary standpoint, it is comparatively new, and it has been felt that its practical operation could not altogether be foreseen. Difficulties would probably arise in practice which would have to be overcome by new devices. That the Board might be thoroughly informed on the practical working of the separate system in places where it has been tried for several years, Horace Andrews, C. E., was sent to the city of Keene, New Hampshire, and to Staten Island, to examine into the operations of the system in the light of the experience at these places. His report is herewith appended, and it is believed that the facts therein given may be valuable, not only to this Board but to the local authorities who are considering the question of introducing the system of separate sewers.

In general, the result of Mr. Andrews' inquiries shows that the working of the separate system has been eminently satisfactory, and that no practical difficulties of any magnitude have arisen in the operation of these small sewers, either in Keene, on Staten Island or at Rockaway.

The city of Schenectady has been contemplating for several years the building of a system of sewers. Prof. Cady Staley, professor of civil engineering in the Union University, made a careful study of the working of the separate system in many places in this country, and as a result advised the city to adopt it. He was directed to make complete plans and specifications for a separate system of sewers in Schenectady, and the contract to build the sewers, according to these specifications, was let to Mr. B. Van Vranken, of Schenectady, in 1884.

We have appended to this report the specifications drawn by Prof. Staley, and also the bids of fifteen different contractors on these specifications. The specifications and bids are given for the information of the Board, and of localities and engineers specially interested.

REPORT ON THE PRACTICAL OPERATION OF THE SEPARATE SYSTEM OF SEWERAGE.

JAMES T. GARDINER, Esq., *Chairman of Committee on Drainage, Sewerage and Topography:*

SIR — In accordance with your instructions I have examined into the working of the separate system of sewerage at Keene, New Hampshire, and at New Brighton and Rockaway in this State. I have endeavored to ascertain not only the thoroughness with which the system of sewerage accomplishes its object, but also to discover whatever defects exist and the methods that have been proposed for their remedy.

I wish to acknowledge my indebtedness for information furnished me through the courtesy of the Hon. Horatio Kimball, mayor of Keene, and Mr. D. H. Sawyer, the superintendent of the sewerage at the same place, and also to Mr. C. T. Barrett of West New Brighton, Staten Island.

THE SEPARATE SYSTEM OF SEWERAGE.

The separate system of sewers is now generally understood to mean that system which has for its object the removal of all waste-water except that furnished by rain and melted snow. The system

may or may not carry the water draining from the sub-soil, but all storm-water is to be carefully excluded.

In the modern separate system as used in this country there are several essential features:

First. The pipes carrying sewage must be of small size, in order that a constant and rapid flow may exist in them and that accumulations of solid matter obstructing the sewers and generating gases may be prevented. It is also desirable to keep the pipes of small size in order that the water used in flushing them may thoroughly cleanse their entire inner surface.

Second. Automatic flushing-tanks are placed at the end of each line of pipe and are arranged to discharge a large quantity of water into the sewers at intervals so as to cleanse them thoroughly.

Third. Perfectly free access of air to the sewers is essential not only to ventilate them, but that the sudden rush of water from the flushing-tanks may not draw the water from traps in houses or force air through them.

There are various accessories to the system, but wherever the separate system is in use in this country the above requisites are regarded as essential.

The details relating to the separate system have already been fully described in the reports of the State Board of Health, and it will be only necessary to treat of them incidentally in referring to the practical working of the system.

Sewerage of Keene, New Hampshire.

This was planned as the result of a memorial, presented in June, 1882, to the city councils by the health commissioners of Keene, by Geo. E. Waring, C. E. The work was executed in 1882–3 by contract with the Drainage Construction Company under personal direction of John Bogart, C. E., of New York. The inspecting engineer employed by the city was L. M. Muzzey, C. E., of Boston. The system comprises the following lengths of pipe:

15 inch.	9,065 feet.	Contract price	$2	05	per foot.
12 "	3,441 "	"	1	61	"
10 "	1,178 "	"	1	34	"
8 "	2,742 "	"	1	06	"
6 "	44,806 "	"		90	"

Aggregate length, 61,232 feet.

The contract price given above includes all materials and expense of laying.

There are forty-four flushing-tanks holding from 140 to 150 gallons of water and capable of being discharged as often as once in six hours, if necessary. Each flush-tank completed cost $63; they were built with double walls having an air-space between to guard against freezing. Extra covers of wood have been provided within the iron covers as an additional protection against frost. Two inlets allow the water of Beaver brook to enter one of the fifteen-inch mains. These inlets were built at a cost of $100 each. There are two outlets, costing $200 each, and fifty-one man-holes, costing $40 each.

The full amount paid by the city for plans, construction, superintendence, land damages, fees, etc., was $79,688.85. The net deductions from the original contract price amounted to $8,414.30, certain streets where it seemed to the city authorities that no connections would be made for a number of years having been omitted from the general plan.

The surface formation in the city of Keene, embraced within the area covered by the sewerage is such as to naturally divide it into two distinct districts with separate outfalls for the sewers into the Ashuelot river. The Central district embraces the central and western portion of the city. The Beaver brook district embraces the eastern section.

The grade of the fifteen-inch main of the Central district averages one in 310, and the laterals have in general a grade of one in 250, though there are four or five short lines whose grade is about one in 400.

The main of the Beaver brook district has a grade of only one in 800, and for a few hundred feet from the outlet of only one in 1000; the laterals of this line have good grades, not less than one in 400.

In the original plan only six man-holes were provided on each district, but, as already mentioned, fifty-one were built at frequent intervals on the mains and at junctions of pipes where they seemed desirable.

The kinds of pipe used were the Boynton, of New Jersey, the Akron, the Portland and English and Scotch pipes. The amount rejected was nearly the same of each kind used, the Portland seeming a trifle the best.

Hand-holes, with loose covers extending about fifteen inches on the top of the pipes, were placed at about every 100 feet on the six-inch sewers, and about every third one of these is replaced by a stand-pipe rising to within a short distance of the surface. By means of the stand-pipes the flow of water at different points can be

examined and the approximate position of any obstruction can be ascertained. Wherever curves were made in the pipes, hand-holes were placed at each end of the curve.

Carefully-selected cement was used in making the joints between sections of pipe, which were first calked with twisted oakum to prevent the entrance of the cement.

Sub-soil drainage is secured by means of drain-tiles, nearly round and non-porous, laid in two-feet lengths, the joints being wrapped about with two thicknesses of muslin. The tile-drains are laid alongside the sewer and at nearly the same grade; they enter the sewer-pipe, or a man-hole, about once in 300 feet.

During the construction of the sewer, Y branches for house connections were provided, and the fee of $5 is charged by the city for making such connection. Maps, carefully drawn on a large scale, enable the exact location of the stand-pipes, hand-holes and house connections to be readily ascertained. Distances from street corners and property lines to the stand-pipes, hand-holes, etc., are expressed in figures upon the maps. These maps are evidently quite essential adjuncts to the system of sewerage.

The Practical Working of the Separate System at Keene.

The number of families to whom the sewers are now accessible is 720, besides seven manufactories and three hotels.

The entire population of Keene, according to the census of 1880, was 6,784.

Water-works were introduced at Keene in 1869, though the city was not incorporated until 1874.

The sewerage system is now in complete working order, it embraces every locality where it is called for and occupies some streets where it will be but little used for some time to come. The sewerage system was completed and accepted about September 1, 1883. On December 1st of the same year ninety-one permits to make house connections had been granted, and on January 1, 1885, the number had been increased to 213.

Sewer-Pipes.

The sewers are, in general, laid at the depth of six feet or more, not only to guard against frost, but to prevent them from interfering with the water-supply pipes, which are laid at a depth of five feet. No trouble has been occasioned by frost, and probably none would have occurred if the pipes had been somewhat nearer to the surface.

In Paris, where laid in earth, a depth of from two and one-quarter to four and one-quarter feet was thought sufficient to protect the sewers from frost.

Notwithstanding the great pains taken to prevent the intrusion of cement at the joints, in some places such partial obstructions were discovered while testing the pipes. No stoppage has been noticed from this cause, however, and in only one instance has there been any stoppage in the mains; this was in Dunbar street, and occurred from the lodgment of quicksand, supposed to have worked through faulty joints in the pipes. Two hand-holes were afterward added between Dunbar and Water streets to facilitate the removal of obstructions at any future time.

It has been noticed that when pipes are removed, which is sometimes the case in making house connections, they soon become very badly cracked and unserviceable. The cause of this cracking is not apparent, and the pipes do not seem defective as long as they remain in place and are not allowed to become dry. The defect mentioned is probably of little consequence at Keene, where frost cannot reach the pipes; but, as there is a considerable difference in the porosity of pipes and their impermeability is an important element in their durability, it would be well to carefully test them in this respect before accepting them. Some sewer-pipes will soak in as much as seven per cent of their weight of water, while others will absorb less than one-half of one per cent.

Roots of trees have been noticed in places inserting themselves into the joints, although they have occasioned no trouble at the present time. It would be desirable to take special precautions to prevent the intrusion of roots where the pipes are laid in the neighborhood of trees.

A very extensive growth of fungus has been observed in the sewer-pipes ever since they have been in operation, and it does not seem to be diminishing in amount. This fungus growth attaches itself to the sides of the pipe only, and it grows for the most part under the water, which flows rapidly through the pipes. In the man-holes, where the upper half of the pipe is removed, the fungus may easily be seen; it is quite soft and easily detached, and has not, thus far, been the cause of any obstruction in the pipes. Last spring the pipes were flushed with a large volume of water, by means of hose attached to the street hydrants, and the fungus was detached in great quantities. When the growth of fungus becomes of considerable bulk, it generally seems to be broken or dragged off by the rapid current

from the flushing-tanks, and it is, therefore, hardly probable that it will ever become a source of trouble.

The frequent emptying of the flush-tanks, together with the flow of water from houses and sub-soil drains, keeps a stream of water constantly running in the mains. In the twelve-inch pipe on Davis street the volume of water was sufficient to nearly half fill it.

Outlets.

At the time of my visit both of the outlets were nearly three feet below the service of the water in the Ashuelot river; they consist merely of fifteen-inch iron pipes projecting a few feet from the shore and slightly inclined down stream. The system of the Beaver brook district receives the drainage of a tannery, which imparts a reddish tint to the water; the discolored water could be plainly seen pouring from the outlet of this system, while at the outlet of the Central district, where the fall is much more considerable, floating matters could occasionally be seen issuing from the mouth of the sewer. It was, therefore, evident that the three-feet head of water did not occasion any difficulty in the discharge.

During high water last spring, when the water rose over eight feet above the outlets, there was still no difficulty experienced in the discharge, though it was thought, when the plans were first made, that jet-pumps, which were to have been worked from the city water supply, would be required at the outlets.

There is a slight bend in the river at the Central district outlet, and last spring the bank at the outlet was somewhat disturbed by the current, which also washed sand in front of the outlet-pipe, yet it was found that the flow of sewage was sufficiently strong to preserve a clear opening through the sand that was heaped up in front of the outlet.

Man-Holes.

The man-holes are covered with close covers of iron, so that their function is not that of ventilation. Up to the present time the man-holes have been of use chiefly as a convenient means of inspecting the flow in the pipes. The experience of a number of years will be needed before a correct opinion can be formed as to the exact number of man-holes that are really necessary. An expenditure of about $1,560 was required to provide the thirty-nine man-holes not included in the original plan. It might have been more economical to have dispensed with these extra man-holes, even if their absence

should render the removal of obstructions somewhat more difficult.

When high water occurs, the interior surfaces of some of the manholes in the lower part of the city become coated with filth, and it is necessary to give these a thorough cleaning when the water has permanently subsided.

FLUSHING-TANKS.

There are now forty-five flushing-tanks in use, one new one having been built in 1884, and one of the original tanks having been moved on account of the extension in Washington street.

Owing to precautions taken in building the tanks, and to the frequent disturbance of the water when they empty, there has been no trouble from freezing, even in the most severe weather.

Water is supplied to the tanks through a one-quarter-inch faucet, which is but partially opened. The tanks are filled in about eight hours, and their entire contents, about 150 gallons, are then discharged by a large bell siphon in about sixty seconds; this is equivalent to a discharge of two and one-half gallons per second.

If a six-inch branch pipe were perfectly clean and there were no house connections it would require nearly three gallons per second, to fill it entirely if it were laid with a grade of one in 300, or three and a quarter gallons per second, with a grade of one in 250. Since many of the laterals are laid with a steeper pitch than one in 250, it is probable that in some of these the flush does not entirely fill the pipe, still no trouble has yet been met with owing to insufficient flushing, and, except for the fungus growth, the pipes are kept in a clean condition and very little odor is perceptible in them.

The same difficulty in keeping the supply-cocks of the flushing tanks from being stopped by sediment has been met with at Keene, as at Memphis, Tenn., though to a less extent.

At Memphis it has been stated by Mr. Wm. H. Baldwin, who inspected the sewerage system in the spring of 1884, that the muddy character of the water furnished by the public works sometimes causes the supply-pipes to become stopped, and one man was employed almost exclusively for looking after the pipes supplying the flushing-tanks with water. The tanks are fed by such a small stream that the very unfit muddy water supplied has a tendency to silt them up and stop the flow. The inspector had to open the cocks full way and blow out the silt.

At Keene the visits of the inspector are made about once in two

weeks, and although the purity of the water supplied generally is such that no stoppage occurs, still there have been occasions when one or two cocks were found to be clogged. Even with the purest water, sediment is to be feared when repairs are made in the water-mains, and the flushing tanks can then become inoperative.

A simple expedient has been proposed that would seem to be effective in preventing clogging of the faucets. This would consist in a float placed in the tank and so connected with the cock that the latter would be automatically turned on under full head when the water rose nearly to the top of the tank. Thus for a few minutes before the water was discharged from the tank the cock would be turned fully on and the sediment would be blown out before it had accumulated in a quantity sufficient to stop the flow altogether.

As the successful operation of the separate system is to a great extent dependent upon the efficiency of the flush-tanks, and, since in many cases very pure water would not be available for filling the tanks, some device for insuring the certain action of the latter, even with very muddy water, should certainly be perfected.

When the tanks are inspected in winter, at times when snow lies deeply on the ground, a bad place is sometimes made in the street, interfering with driving. It might, therefore, be desirable to place the tanks a little to one side of the traveled roadway.

At Keene the mains were thoroughly flushed last spring by turning water into the tanks from the street hydrants, a hose being used for the purpose. By this means the fungus growth was removed for the most part. It would be much more convenient at places where such extra flushing seems desirable to have an arrangement provided by means of which water could be turned into the sewer-pipes directly from the water-mains without the necessity of employing hose.

SUB-SOIL DRAINAGE.

The sewerage system at Keene has not yet been in operation for a sufficient length of time to enable a correct judgment to be formed as to the efficiency of the sub-soil drains.

A well-known authority has said: "In all works of sewerage in order to get their full benefit it is requisite that provision should be made for the drainage of the sub-soil. The mere fact of carrying out a system of sewerage and being obliged to cut through various strata of a more or less retentive character is naturally a means of

securing to a great extent sub-soil drainage; but it is not well to depend entirely upon the intersection of various geological formations, as it has been shown that drainage works when first brought into operation, or during their construction have had greater effect in drying the sub-soil and in reducing the rate of death arising from phthisical disorders, than has been secured in after years. This may be accounted for from the fact that the drainage of the sub-soil was more perfect prior to the complete consolidation of the sewer-trenches than it has been subsequently." The earth with which sewer-trenches are filled is seldom as compact as it was previous to the excavation, sometimes a layer of gravel or sand is placed over the sewers, which should in that case be embedded in clay, and thus the sub-soil secures permanent drainage. At Keene the contracts specify that the filling over the sewer-pipes shall be of fine, dry earth.

It appears evident, therefore, that the efficiency of the tile-drains cannot be readily ascertained. At some places in Keene the sub-soil has been much dried and wells have failed since the sewers were built. This may be due to the sub-soil drains or merely to the digging of the sewer-trenches.

The actual amount of water flowing from the tile-drains, if it could be ascertained, would enable a judgment to be formed as to their efficiency. At Memphis where the sewers have been laid four years a very perceptible drying of the sub-soil is said to have taken place, but it is uncertain as to the amount of drying that can be ascribed to the tile-drains. It would certainly seem that agricultural tiles laid as at Keene would have some effect in diminishing the water in the sub-soil. It would doubtless be well to lay branches to the cellars when house connections are made with the sewers, especially where the houses are at some distance from the latter. If it is necessary to discharge the ground-water into the sewers it might with comparative safety be done at the man-holes where a gate could be provided to prevent the backing up of sewage during the continuance of high water, or in the event of the sewer-pipe becoming obstructed. At Keene there is certainly danger of sewage being forced up the sub-soil pipes in the lower part of the city, whenever the water is high in the river, and if the sewer should be obstructed the sub-soil might be extensively flooded with sewage before the obstruction was discovered and removed.

Storm-water.

Surface-water is removed at Keene partly by means of two sewers of large size, which formerly received a certain amount of house-drainage. These sewers follow lines of natural drainage, and although by special resolutions of the city council passed last summer, they can no longer be used as public sewers, they still relieve the ground of much storm-water. In parts of the village outside of the drainage area of these sewers, storm-water is for the most part carried off in ditches at the sides of the streets.

House Connections and General Administration.

In order to fully describe the methods adopted for making house connections, the precautions that have been taken to insure the perfect working of the separate system at Keene, and also the plans that have been there devised for the future administration of the system as regards its care and management, the following ordinance is quoted without abridgment:

An ordinance to regulate the house-drainage and the connections with the public sewers.

Be it ordained by the City Councils of the city of Keene, as follows:

Section 1. The general care and management of the new sewers now in process of construction by the Drainage Construction Company, in Keene, shall be vested in a board of water commissioners, after the same shall have been completed and turned over to the city, agreeably to the contract between said company and the city, and their power shall be subject to any limitations and restrictions contained now or hereafter in any ordinance, regulation or order of the city councils; and the members of said board shall receive such compensation for their services as may be determined by the councils, but they shall incur no debt against the city, except for necessary repairs and care, unless ordered by the board of mayor and aldermen.

§ 2. The person serving as superintendent of water-works shall also be superintendent of sewers, and he shall receive such additional compensation for his services as the councils may from time to time determine. Said superintendent of sewers shall have supervision of

the construction and repair of all house-drainage, and after the completion of the original contract, shall superintend all repairs of said sewers and their connections; and he shall keep a description, with plans, of the sewer and connections, and an account of all expenses in his department, all under the directions of the water commissioners.

§ 3. Before any house-drain shall have been connected with said sewers, the owner thereof, or applicant, shall pay to the superintendent of sewers the following fees, viz.: For every house-drain, $5 for the connection. And all persons who have made such connections, or shall have made them before the completion of said sewers, shall pay said fees; and their connections, drains, etc., shall be subject to this ordinance in all respects, and the superintendent of sewers shall see that all such connections, drains, etc., conform to the requirements of this ordinance. All moneys collected by the superintendent of sewers shall be paid to the city treasurer twice a month, and the treasurer shall keep the same as a separate fund.

§ 4. No plumbing, house-drainage or connections shall be done or made in connection with the sewer by any person not licensed to do such work by the board of mayor and aldermen, under a penalty of $20.

§ 5. The following regulations shall govern the planning of all house-drainage and house connections with sewers:

1. For each building there shall be a separate connection with the public sewer of four-inch salt glazed vitrified pipe, which may extend from the sewer to within five feet of the house, and from thence the house-drain shall be of cast-iron pipe, satisfactory to the superintendent of sewers, and shall extend upwards, so that its upper terminus shall communicate directly with the open air in a manner which shall secure perfect ventilation. That portion of the soil or ventilation-pipe above all fixtures may be of material, and dimensions satisfactory to the superintendent of sewers.

2. No trap or any manner of obstruction to the free flow of air through the whole course of the drain and soil-pipe will be allowed.

3. Every fixture shall be effectually trapped. No sink-drain pipe shall be more than one and one-fourth inches in diameter.

4. No privy-vault or cess-pool shall be connected with the house-drain or sewer. When water-closets take their place, they shall be thoroughly cleaned out, and filled with fresh, dry earth.

5. No sub-soil drain shall be connected with the house-drain at any point, the house-drain being made and kept absolutely tight for

the removal of foul water without the least opportunity for escape into the soil; and drain-pipe, waste-pipe or rain-water conductors shall under no circumstances be connected with the house-drain.

6. Every water-closet shall be adequately flushed with water from a cistern above it; except that, where a cistern is liable to freeze, other methods may be permitted, provided that thorough flushing is secured. No closet shall be used which has a space between two water seals of more than 200 inches capacity, or which has such space of any capacity, every part of the walls of which is not thoroughly flushed and washed at each use of the closet. Every water-closet apartment shall have a direct means of ventilation into the open air.

7. All soil and waste-pipes shall be as direct as possible, and all parts of the work shall be so arranged that they may be at all times readily examined and repaired. Before the fixtures are placed in connection with the plumbing work of any house, and before the soil-pipe is connected with the drain, the outlet of the soil-pipe and all openings into it shall be hermetically sealed; the pipe shall then be filled with water to its top and every joint shall be carefully examined for leakage, and all leaks shall be securely closed before connections with the soil-pipe are made.

§ 6. All drain-laying, repairs and connections shall be made according to the following rules, and if any drain be constructed or repaired, or any excavation made for that purpose without a permit in writing from the superintendent of sewers, or in a mode different from that prescribed herein, the person doingsuch work and the owner or agent directing the same shall respectively be liable to a penalty not exceeding $20 and the person doing such work shall also forfeit his license for a period of six months.

Rules for Drain-Laying.

1. Before any connection with the public sewer is made, or any house-drainage put in, or any repairs on them, a permit must first be obtained and the plan proposed approved by the superintendent of sewers.

2. No pipes or other materials for drains can be used till they have been examined and approved by the superintendent of sewers. All the work must be inspected by him and done to his satisfaction.

3. In opening any street or public way, all materials must be placed where they will cause the least practicable inconvenience to

the public, and the whole inclosed with sufficient barriers and properly lighted at night from the beginning to the end of the work.

4. No street shall be opened until the Y branch of the sewer and the entire course of the drain to be laid shall have been precisely staked by the superintendent of sewers.

5. The least inclination that can be allowed for house drains is one in sixty, without the written permission of the superintendent of sewers.

6. In the "house connection" every joint shall be laid with gasket and cement, and bedded in hydraulic concrete at least four inches in depth. The house-drain and soil-pipe must be calked with lead so as to be both water and air-tight. All joints must be satisfactory to superintendent of sewers.

7. The ends of all pipes not to be immediately connected are to be securely closed water-tight, with imperishable materials. The inside of every drain, after it is laid, must be left smooth and clean throughout its entire length, and true in line and grade.

8. The back-filling over drains, after they are laid, must be puddled or rammed, all water and gas-pipes protected from injury or settling, and the surface of the street made good within forty-eight hours after the completion of that part of the drain lying within the public way.

§ 7. This ordinance is to take effect from its passage, with this reservation, to-wit: that nothing in it shall be construed in a sense that will relieve the joint standing committee on sewers and drains from the performance of certain specific duties in relation to the sewers during their construction as provided in a joint resolution passed January 18, 1883, nor to authorize any connection with the main sewer until the same is delivered to the city by the Drainage Construction Company as per terms of their contract.

Passed July 21, 1883.

There are different opinions as to the advisability of dispensing with the running traps in the house-drains; if they are not used the inhabitants should certainly be warned of the dangers that may arise from defective traps, dangers that will be considerable with the separate system, for, if the water-seal is once broken, the air from the house-drains and sewers will be forcibly driven into the houses whenever the flushing-tanks are discharged.

When a house is to be left vacant for several weeks, it would be well to require the occupants to apply to those in charge of the sewerage system, that they may cause the traps to be filled with crude

oil or glycerine that thus evaporation may be prevented. If the matter should be left to the attention of the occupants themselves, it would very probably be disregarded, or some unsuitable oil, like kerosene or linseed, would be used as the only cheap article readily obtainable.

Grease-traps are regarded as desirable adjuncts, but their use is not compulsory at Keene, as it is thought that stoppages will occur in the four-inch house-drains before the sewers become seriously obstructed. Only one house-drain has been stopped, as yet, and that was from a mass of coffee-grounds, tea leaves and grease. There were no water-closets in the house in which the stoppage occurred, and no means of thoroughly flushing the drain.

Cost of Sewerage System and Expense of Maintenance.

Allowing for the usual increase of population, the city of Keene should have had about 7,100 inhabitants in 1884. A debt of $70,000, with interest at four per cent, was incurred for the construction of the sewers, to meet the interest of which, a tax of $2,800 per year is levied. The principal of the debt is to be paid off, in four installments of $15,000 each, in 1905, '6, '7, and '8 and the remaining $10,000 in 1909.

During the year ending December 1, 1884, the entire cost of extension and maintenance was $1,161.29.

In 1884 there were 1,795 polls; the rate of taxation was $1.15 per $100, and the total valuation of the city was $5,922,043.

It is, therefore, evident that the construction of the sewers has not imposed a very heavy burden upon the tax payers, since the debt could now be paid by a tax of $1.18 per $100, while the actual cost of maintenance during 1884, amounting to $678.04, would have been covered by a tax of less than twelve mills per $100.

The general sentiment, at Keene, is one of satisfaction regarding the operation and expense of the sewerage system.

Experience with the Separate System at New Brighton and at Rockaway.

Although at these places the separate system has not been used on a large scale, an account of its practical operation will be of interest since this system is said to be especially adapted for small villages and hamlets or even for groups of houses of very limited number.

At New Brighton two lines of pipes, without laterals, are in use. Both of these lines were designed to serve as mains, and they were of such a size as would accommodate a large number of houses.

One line of pipes is 3,700 feet long; it has at places an inclination as small as one in 400. At the outlet this pipe is nine inches in diameter, diminishing to eight inches and then to six inches.

There is one flushing-tank at the end of this line discharging 120 gallons once every three or four hours; only about forty houses have made connection with the sewer on this line.

The second line of sewers at New Brighton is 4,000 feet in length without laterals, and of four, five, six, seven and eight inches in diameter, increasing toward the outlet. A flushing-tank has been also placed at the end of this line, and it is the design to place a second one at the commencement of the eight-inch pipe.

Man-holes have been placed at intervals along the lines of sewers; these have gratings over them so as to admit the air freely. It is doubtful whether open covers to the man-holes are advisable for the purpose of ventilation, as they will serve to prevent the air from being drawn through the soil pipes in the houses when the flushing-tanks discharge. The pipes in the separate system of sewers are probably in less need of ventilation than the soil-pipes of the houses. The metropolitan board of works of London, as the result of their experience during twenty years, have said that "the most efficacious mode of preventing the escape of offensive effluvia from the sewers is to provide them with such a copious supply of water that the decomposing matter within them shall be diluted and removed before any noxious gases have been generated;" this is precisely what is done in the separate system, but from the nature of the case a like effectual flushing cannot be given to the soil-pipes. Where running-traps are dispensed with, as at New Brighton and Keene, the frequent flow of air through the soil-pipes, from the suction produced by the water discharged from the flush-tanks, is probably as effective a method of oxidizing the filthy matters in the house-drains and soil-pipes as can be readily devised; hence the covers of the man-holes should be tight, so as to render the draught through the soil-pipes as powerful as possible.

Only one stoppage has occurred in the pipes, and that was from a tomato can, which might easily have been kept out of the pipe with proper care.

Sub-soil-pipes were laid in the same trenches with the sewer-pipes, but entirely independent from them. Difficulty was experienced in laying the sub-soil-pipes from the intrusion of earth; especially if heavy showers occurred unexpectedly, when large quantities of earth would be washed into the pipes. No branches were led up to the

cellars from the sub-soil-pipes. Large grease-traps placed outside of the houses, and ventilated by special pipes running up to the roofs, are used to some extent, and are said to be efficient in preventing grease, etc., from passing into the house-drain.

Drains from the cellars leading directly to the sewers have been proposed, but these would have to be provided with a gate to prevent sewage from backing up when an obstruction occurred in the pipes, and the end of the drain passing into the cellar would require to be well sealed by a deep trap, and some arrangement would be needed for supplying the latter with water as rapidly as it evaporated.

This arrangement would be a dangerous and unsanitary one unless very unusual care was taken, and it cannot be recommended for general adoption.

Connections with the sewers are made by breaking a hole in the top of the latter and cementing a saddle-piece with a T connection over the hole, so that the house-drainage is discharged into the top of the pipe. Traps in the house-drains are considered objectionable as tending to cause stoppages in the drain while any object that has successfully passed through the house-drain is said never to occasion any difficulty in the sewers.

At Wave Crest, Rockaway, L. I., a four-inch sewer has been laid across a salt marsh for a distance of 2,800 feet. This small pipe is nearly level, the total fall being only three inches, yet during the nine years in which it has been in use no stoppages have occurred and no trouble of any sort has been met with. There are twenty-three houses on this line of pipe, most of which have three water-closets and one or two bath-tubs. A flush-tank at the end of the line of pipe is supplied by means of a wind-mill.

The results of experience with the separate system at New Brighton indicate that the principal difficulties to be met with are those of administration. In small places, where it is difficult to obtain constant inspection by persons thoroughly acquainted with those essentials necessary for the perfect working of the system, trouble may be expected from careless supervision and from bad workmanship in making house connections. Strict ordinances are necessary, and too great care cannot be taken to see that they are thoroughly enforced.

There may be places where good administration could be obtained through companies formed by those of the residents who thoroughly appreciate the sanitary needs of the community. Such companies would provide the people with sewerage in very much the same way

that gas and water are now frequently furnished. The financial success of a corporation formed for the purpose of providing a means for sewage disposal would, however, not be as well assured as though its object was to supply wants more generally felt. It is not improbable that public sentiment would be more alive to defects in the administration of a company of private individuals than would be the case if the matter was in the control of the village authorities. In towns and villages where an enlightened public sentiment exists, it would be in the interest of economy to keep the control of the sewage in the hands of the local government, in which case special care should be taken to secure competent inspection and faithful workmanship.

HORACE ANDREWS, JR.

ALBANY, *January* 30, 1885.

SPECIFICATIONS FOR SEWERS IN THE CITY OF SCHENECTADY, N. Y.

1. The sewers shall be constructed of glazed earthenware sewer-pipe of the best quality (except under the Erie canal, where it shall be of iron), which shall be provided with Y branch connections of four inches in diameter on each side opposite every lot in front of which it passes.

2. They shall be located on the lines shown on the plans of the work, and will be staked out by the engineer. This line, whenever practicable, will be on the center line of the street. The committee, however, reserve the right to move the line of sewers to the right or left whenever obstructions are met which render a change of line desirable.

3. The contractor will be required to preserve all stakes and bench marks until permission is given by the engineer to remove them.

Excavations.

4. All excavation shall be by open cut from the surface. No tunneling will be allowed, except written permission be previously obtained from the engineer.

5. Whenever the material is of such a nature as to allow it, the excavation up to the greatest horizontal diameter of the pipe shall be made to conform to the shape of the pipe to be laid in it. Above this line the cut may, in ordinary cases, be carried to the surface at such a slope as the contractor may choose.

6. Should the contractor think it best to keep the sides of the excavation vertical, by bracing or otherwise, it is expressly understood that it shall be done at his own cost.

7. The sides of the excavation, whenever it shall be necessary in the opinion of the engineer, shall be supported by suitable plank and shoring, but no allowance will be made therefor unless the same is left in the trench by written order of the engineer.

8. The excavation, at the bottom, is to be made and shaped as nearly as possible, to fit the lower half of the pipe to be laid, with holes cut at the joints for the sockets to rest in, so that the pipes shall have a uniform bearing on the ground from end to end. The excavation at the joints shall be at least six inches outside of the joints to enable the joints to be perfectly cemented.

9. At the height of half the diameter of the pipe from the bottom, that is, at the height of the greatest diameter of the pipe, all trenches are to be eighteen inches wider than the greatest diameter of the pipe to be laid therein.

10. The trench shall be dug to within six inches of grade by measurement from the witness stakes on the surface. The last six inches shall be taken out after the grade pegs have been set in the bottom of the trench by the engineer.

11. The approximate depth of the cutting will be marked by the engineer on witness stakes before the excavation is begun. Grade pegs will be set by the engineer every twelve and one-half feet on the center line at the bottom of the trench.

12. In no case, without previous written permission from the engineer, shall more than .... feet of trench be opened in advance of the completed sewer.

13. The material excavated shall be laid compactly on the sides of the trench and kept trimmed up so as to be of as little inconvenience as possible to the traveling public and adjoining tenants.

14. The contractor shall not obstruct the gutter of any street, but shall use all proper measures to provide for the free passage of surface water along the gutters.

15. The contractor shall provide for all water-courses and drains interrupted during the progress of the work, and replace them in as good condition as he found them.

16. The contractor shall keep the trenches free from water during the progress of the work, as no pipe will be laid in water in any case whatever.

Protection of Water and Gas-pipe.

17. The contractor shall do whatever may be necessary to keep in position and to protect from injury all water and gas-pipes, lamp posts, service-pipes and all other fixtures which may be met with in carrying on the work.

In case any of the said gas or water-pipes or other fixtures be damaged, they shall be repaired by the parties having control of the same, and the expense of such repairs shall be deducted from the amounts which may become due the contractor.

Protection against Accidents.

18. The contractor shall erect suitable barriers around all excavations to prevent accidents to passengers on the streets, and shall place and maintain during the night sufficient red lights on or near the work.

19. The contractor shall have charge of and be responsible for the entire line of sewers for whose construction he has contracted until their completion and acceptance.

Back Filling.

20. The earth filled around and on top of the pipes shall be free from stone and tamped with the utmost care, so as to obtain the greatest compactness and solidity possible. In filling, the earth shall be kept at the same height on both sides of the pipe. The earth shall be rammed in layers of not more than one foot thick up to the surface of the street, and in no case shall the number of men filling be more than twice the number of men ramming.

21. The trench must in all cases be filled to the proper grade with suitable material, free from stones over four inches in diameter. Should there be a deficiency of proper material for refilling the trench, the contractor will be required to furnish the same at his own cost.

Repaving and Restoring Streets.

22. Where the pavement has been removed, it must be replaced by the contractor and left in as good condition as it was before being removed.

23. All surplus material and rubbish must be removed by the contractor.

24. All work of restoring the surface of the streets shall be done to the satisfaction of the Superintendent of Public Streets.

Protection of Property.

25. The contractor shall, at his own expense, shore up, protect and make good, as may be necessary, all buildings, walls or fences injured or liable to be injured during the progress of the work; and the contractor will be held responsible for all damage which may happen to neighboring property from neglect of this precaution or from any other cause connected with the prosecution of the work.

Pipes — How laid.

26. All pipes over eight inches in diameter shall be laid with a straight-edge, beveled to grade, furnished by the engineer. One end of the straight-edge shall be placed on the nearest grade peg and the other on the flow-line of the pipe to be laid, and the height of the pipe shall be so adjusted that a builder's level placed on the upper edge of the straight-edge shall be perfectly level. The level used for this purpose must be kept in perfect adjustment by the contractor.

All pipes eight inches and less in diameter shall be laid in the following manner: A mason's line shall be tightly stretched parallel to the grade and slightly above the sockets of the pipes. This line will be supported over the center at distances not greater than twenty-five feet apart. The exact grade for each pipe shall be obtained by measuring down from this line.

27. Especial care must be taken to lay the pipe to the exact grade and line.

28. All pipes previous to being lowered into the trench shall be fitted together and matched, so that when jointed in the trench they may form a true and smooth line of pipes.

Joints.

29. A gasket of oakum or other material approved by the engineer shall be pressed into the joint around the entire circumference of the pipe to prevent the entrance of cement to the inside of the pipe. No joint shall be cemented until the gasket of the next joint in advance has been completed.

30. The cement shall be pressed into the space between the socket and spigot so as to entirely fill the space, and the bevel joint at the end of the socket shall be smoothly and evenly made.

Special care must be taken to make perfect joints at the bottom of the pipe.

31. The excavation made for the socket of the pipe shall be filled with sand to support the cement firmly in position. When water accumulates in this excavation it must all be removed with a syringe or sponge before the joint is made.

32. When the joint is completed, great care must be taken not to disturb the pipes.

Cement.

33. The cement for filling the joints shall be pure, fresh-ground Rosendale cement of best quality, with only enough water added to give it the proper consistency, and shall be used as soon as mixed.

Branches, "Ts," etc.

34. The "Y" branches, "Ts," lamp-holes, hand-holes and man-holes shall be placed at points indicated by the engineer. Their location will be indicated by stakes driven at the sides of the trench.

The "Y" branches shall be elevated to correspond to the lateral sewers and house-drains entering them. They shall be closed with an earthenware cap, and the space above the cap shall be filled with sand covered with a thin coating of cement.

Sewers to be kept clean and free from water.

35. All the pipes must be kept thoroughly clean, and no water will be allowed to flow through them in any case whatever, during the construction of the sewers.

36. When the trench is left for the night, or the pipe-laying is stopped by rain storms or any other cause, the ends of the pipes must be closed water tight with a plug and cement or with bricks and cement, as the engineer may direct.

37. When running quicksand or other treacherous ground is encountered, the work shall be carried on day and night should the committee so require.

Artificial foundation.

38. Whenever ordered by the engineer, in writing, the contractor shall excavate to such depth below grade as the engineer may direct, and the excavation shall be brought to grade with such material as shall be ordered by the engineer; the extra work to be paid for upon the estimate of the engineer.

If the contractor excavate below grade without orders, he will be required, at his own expense, to fill the excess of excavation with such material as the engineer may direct.

Concrete formations shall be placed under the flush-tanks and man-holes when so directed by the engineer.

Hand-holes.

39. At intervals of 100 feet a piece of sewer pipe shall be laid having a detachable section on the upper surface so that access may be readily obtained to the interior of the pipe.

Lamp-holes.

40. Lamp-holes shall be constructed by placing a six-inch "T" branch vertically in the sewer and bringing it up to within one foot of the street surface by adding pipes of the same diameter. The top of the lamp-hole shall be protected by a cover as shown in the detail drawings.

Man-holes.

41. The man-holes shall be constructed of hard brick laid in cement mortar. The thickness of the wall shall be eight inches. The form shall be a truncated cone, five feet in diameter at the bottom and two feet at the top. The bottom shall be on a level with the bottom of the sewer-pipe and the top on a level with the street surface. The top shall be covered with a cast iron perforated cover, with dust pan underneath. (See drawings.)

Cement Mortar.

42. The cement mortar for man-holes, lamp-holes and concrete shall be made of best quality of fresh-ground Rosendale cement and clean, sharp sand, in the proportion of one measure of cement to two of sand. The sand and cement shall be thoroughly mixed dry and such quantity of water added so as to form a paste of the proper consistency. All mortar to be fresh for the work in hand. No mortar that has begun to set will be allowed to be used.

Concrete.

43. The concrete used on the work shall be made of stone, broken so as to pass through a two-inch ring, and cement mortar. The stone shall be free from dirt. The cement, sand and stone shall be

mixed in the proportion of one of cement, two of sand and two of stone.

Materials — How furnished.

44. All pipes and other materials shall be furnished by the contractor.

Materials to be inspected by Engineer.

45. No materials of any kind shall be used in the construction of the sewers until they have been examined and approved by the Engineer.

Freezing Weather.

46. No pipes or masonry will be allowed to be laid in freezing weather.

Disorderly or incompetent Workmen.

47. If any person employed by the contractor on the work shall appear to the Engineer to be incompetent or disorderly, he shall, on the requisition of the Engineer, be immediately discharged, and such person shall not be again employed upon the work without the permission of the Engineer.

Length of Sewer.

48. The length of the sewer will be measured on the centre line of the pipe.

Interpretation of Term.

49. Wherever the word "committee" is used in these specifications it shall be held to mean the "Committee on Sewers" of the Common Council of the City of Schenectady, N. Y.

50. Wherever the word "engineer" is used it shall be held to mean the Engineer in charge of the sewers, or his authorized assistant.

51. Wherever the word "contractor" is used it shall be held to mean either any contractor or firm of contractors, or any member of a firm contracting for work herein specified.

52. Bids shall state the price per lineal foot of pipes of each size laid as herein specified, and for the various depths named, which price shall be in full for all labor and materials required for the complete execution of the work; also the price for each man-hole, flush-tank and lamp-hole complete.

53. Payments for the work will be made monthly upon the estimate of the Engineer. Twenty per cent ($\frac{20}{100}$) of the amounts due will be retained as a guarantee against poor workmanship and materials. One-half of this reserve will be paid as soon as the work is completed and accepted and the other half after the expiration of one year after the acceptance of the work.

SCHENECTADY SEWERS.

Proposal for furnishing Materials and constructing Sewers in the City of Schenectady, in accordance with the specifications herewith annexed:

Items.	Prices.
Price per lineal foot for furnishing and laying 18-inch pipe, including Ys, branches, detachable covers and cement joints	
Price per lineal foot for furnishing and laying 15-inch pipe, including Ys, branches, detachable covers and cement joints	
Price per lineal foot for furnishing and laying 12-inch pipe, including Ys, branches, detachable covers and cement joints	
Price per lineal foot for furnishing and laying 10-inch pipe, including Ys, branches, detachable covers and cement joints	
Price per lineal foot for furnishing and laying 8-inch pipe, including Ys, branches, detachable covers and cement joints	
Price per lineal foot for furnishing and laying 6-inch pipe, including Ys, branches, detachable covers and cement joints	
Price per lamp hole, including all materials and labor	
Price yer man-hole, including all materials and labor	
Price per flush-tank, including all materials and labor	
Price per lineal foot for all excavation and back filling under 6 feet	
Price per lineal foot for all excavation and back filling over 6 feet and under 8 feet	

Price per lineal foot for all excavation and back filling over 8 feet and under 10 feet.....

Price per lineal foot for all excavation and back filling over 10 feet and under 12 feet.....

Price per lineal foot for all excavation and back filling over 12 feet and under 14 feet.....

Price per lineal foot for all excavation and back filling over 14 feet and under 16 feet.....

Price per lineal foot for all excavation and back filling over 16 feet and under 18 feet.....

Price per lineal foot for repaving.....

The undersigned hereby propose to the City of Schenectady to furnish all the materials and perform all the labor necessary to complete such amount of the above mentioned work as shall be awarded to the undersigned by the said city or the Committee on Sewers of the Common Council of said city, at the prices named in the preceding proposal, and on the acceptance of this proposal do hereby bind to enter into a contract with the said city, at such time and place as shall be required by it, to perform the said work before the day of 188 , for the consideration and at the prices named in the foregoing proposal. Also to furnish such security as may be required for the faithful performance of the work, the payment for materials contracted for, and for the payment of laborers' wages and liens which may arise therefrom.

Dated at Schenectady, N. Y., the day of 1884.

Contractor's signature, [L. S.]

Postoffice address,

BIDS FOR CONSTRUCTING SCHENECTADY SEWERS.

	Price per foot for excavation and back-filling, under 6 feet.	Price for excavation and back-filling, 6 feet and under 8 feet.	Price for excavation and back-filling, over 8 feet and under 10 feet.	Price for excavation and back-filling, over 10 feet and under 12 feet.	Price for excavation and back-filling, over 12 feet and under 14 feet.	Price for excavation and back-filling, over 14 feet and under 16 feet.	Price per lineal foot for furnishing and laying 8-inch pipe.	Price per lineal foot for furnishing and laying 10-inch pipe.	Price per lineal foot for furnishing and laying 12-inch pipe.	Price per lineal foot for furnishing and laying 18-inch pipe.	Price per man-hole, including materials and labors.	Price per flush-tank, including materials and labors.	Price per lamp-hole, including materials and labors.	Price per lineal foot for repaving.	Total.
	cts.	cts.	cts.				cts.	cts.	cts.					cts.	
Samuel Moak	16½	22	90	$ 93	$ 40	$ 45	25	34	41	$ 60	$48	$47	$5 50	08	$37,571 30
Hinds, Moffat & Co	24	46	70	96	1 12	1 82	23	31	38	65	42.02	72.25	8 20	05	40,887 55
J. A. Hallnan	27	35	80	1 00	1 50	3 30	22	30	38	82	51	76	10 00	04½	42,658 00
Doyle & Stanton	37	43	54	59	72	90	18	27	35	52	38	40	2 25	12	41,096 70
Robert Bryce	27	29	34	39	55	95	23½	31½	38	66	54.75	85.50	8 79	05	37,052 60
Spaulding & Lenane	42	47	62	90	1 05	1 20	18	27	33	57	45	55	5 50	12	45,672 50
B. J. Coyle	37	45	50	56	62	70	33⅜	50	60	1 00	30	45	10 00	07	49,720 67
S. E. Babcock	28	33	48	60	70	1 00	25	33	38	75	40	50	1 75	07	39,043 70
Sloan & McIlvain	34	41	52	63	74	87	27	34	39	59	25	50	8 00	05	41,895 20
Sherman & McDonald	25	36	53	95	1 50	2 00	24	31	36	58	45	65	7 50	20	45,404 60
W. E. Dean	20	40	60	1 10	1 25	1 50	23	33	47	60	36	50	4 00	10	39,993 80
B. Van Vranken	13	20	30	35	40	50	19	26	32	55	30	35	6 00	03½	25,369 10
J. McEncroe	22	28	75	85	95	1 10	17	23	27	49	34	40	7 75	08	34,323 20
S. V. Trull	13	16	18	20	30	38	18	30	39	50	40	30	1 50	01	22,460 10
M. Nolan	11	26¾	42½	55	82¼	98	16¾	24½	30	58¼	37.27	44	5 00	05½	27,179 32

The contract was taken by Mr. Van Vranken, and the sewers are being constructed by him.

CONCLUSIONS OF DR. ALFRED L. CARROLL,

To the Committee on Drainage, Sewerage and Topography:

Dr. Curtis' report, showing the incidence of diphtheria at Sandy Hill for several successive years, chiefly during the winter months, seems to point to pollution of the ground-atmosphere as a factor in the outbreak at such seasons when the closure of doors and windows diminishes ventilation, and the artificial warmth of house interiors exerts a certain suction upon the fouled air contained in the surrounding soil; and it is probable that this factor, in the present as well as in past years, has borne its part in localizing and intensifying the effects of other insanitary conditions. Indeed, the earlier cases in the vilely arranged tenement described by Mr. Wilson may be reasonably ascribed to domiciliary filth-poisoning.

In the present unsatisfactory state of knowledge concerning the etiology of diphtheria it is impossible to determine accurately the relative influence of personal contagion, transportation by specifically infected articles, or pollution of air or water; but there is sufficient evidence to warrant the opinion that the disease is often, if not commonly, generated *de novo* from the products of putrefaction of organic (usually animal) matter; and that the contamination of either the respired air, or the drinking water, by such products can, under certain as yet undefined conditions, give rise to severe outbreaks. In the instances under consideration the school-house appears to have been a central focus, though, in the absence of positive data respecting the school-attendance and domestic history of the children affected, the character and extent of its agency cannot be precisely estimated; and we are left to the alternative hypotheses that the infection may have been imported from a pre-existing source and spread through school intercourse, or that it may have originated in the school, and been carried thence to the surrounding neighborhood. The cessation of the epidemic soon after the closure of the school lends probability to the latter supposition; but the prior existence of the malady, and the lack of connecting links between the cases occurring in adults and infection arising in the school render it probable that some of these examples are due to purely local causes. The appended reports afford indications of widespread contamination of soil and water, favored by the porous nature of the superficial layer, and the impermeability of the subjacent strata. In addition to the soakage from the cemetery, uncemented privy-pits everywhere contribute their foul leachings to

the ground-water wherein wells are sunk, and the examinations by Dr. Hailes show that many of these wells are laden with decomposing organic matter. Without entering into the minutiæ of the "germ theory," it may be stated that the multiplication of bacteria implies the existence of decomposing or decomposable organic matter; and that the commonest variety of these microscopic fungi is believed to be the special ferment of putrefaction of albuminoid substances, with the resulting evolution of sceptic poison. The rapidity of the development of colonies of bacteria in a perfectly sterilized gelatin preparation, inoculated with the water under examination, is regarded as indicating approximately the degree of dangerous pollution. In this respect Dr. Hailes shows that nearly all the wells at Sandy Hill are contaminated; but other data in this report render it probable that the contamination proceeds from different agencies. Chlorine, when present in excess of the amount derivable from natural sources, is very commonly significant of pollution by excremental matter; urine containing a large proportion of it. The great quantity of chlorine in some of the wells would warrant a suspicion that in these soakage from adjacent privy-pits is the chief origin of fouling. But in other instances (and notably in the school-house well and its vicinity) it is noticeable that with a much smaller percentage of chlorine, the development of bacterial life is even more rapid, and in such cases the drainage from the cemetery may be the principal factor.

Whatsoever uncertainty may exist as to the immediate causation of the outbreak of diphtheria, there can be no doubt that the insanitary conditions prevailing at Sandy Hill are sufficient to endanger public health, and to intensify epidemic diseases, and that energetic measures should be adopted for their abatement. Under the peculiar geological and topographical circumstances of the village, sewerage is, even more than elsewhere, a sanitary necessity; and, while awaiting the construction of sewers, the use of uncemented privies should be at once abandoned, their contents removed, with free employment of disinfectants, and some dry-method of excrement disposal substituted in their stead. But even if this be done, a long time will be required for the complete oxidation of the organic filth with which the soil is loaded, and the surface-wells will still be subject to contamination. Until a pure and wholesome water supply can be obtained the inhabitants should be cautioned to boil the well-water before drinking it. This precaution should be enforced as regards the school well, if it be necessary to use it at all.

The tenement referred to in Mr. Wilson's report should be condemned as unfit for human habitation, its owner compelled to rectify the glaring defects in construction, and its occupants forced to observe sanitary regulations.

As regards the cemetery, no future interments should be permitted in it, and its surface should be, as far as possible, planted with rapidly growing trees and herbage. A. L. C.

REPORT OF DR. F. C. CURTIS.

To JAMES T. GARDINER, Esq., *Chairman of Committee on Sewerage, Drainage and Topography:*

SIR — Under your direction, and in company with Mr. O. S. Wilson, C. E., I made a visit to Sandy Hill, Washington county, on the 26th January, to make an inquiry into the etiology of an unusual prevalence of diphtheria, which had been reported to the State Board of Health.

Three cases of this disease occurred in July, all of them in one family, two proving fatal. The epidemic proper, however, developed about the middle of December. On the 13th, a child seven years of age was taken. Three days later another child was taken, in another family, at a distance of two blocks. Both of these were fatal cases. On the same day two other cases were reported, one a child, the other an adult. On the 20th, four new cases developed, three of them being members of one family, and all under eight years of age. Five fresh cases arose on the 22d; two were children nine and ten years old, one an adult, and the other two a mother and child.

These were the last cases to occur at this time. A month later, during the latter part of January, three cases developed, two adults and a girl of twelve. No new cases have since been reported. In all, nineteen cases have occurred, of which thirteen broke out during one week in December. There were in all four deaths.

The history of Sandy Hill shows that cases of diphtheria have been of yearly occurrence. The health officer, Dr. C. L. Infield, and his predecessor, Dr. Wilson, informed me that there are few years in recent time in which a few cases have failed to be developed as the cold months came on. Four years ago they were especially numerous, three of them then terminating fatally. This outbreak especially affected the central part of the village.

Sandy Hill consists for the most part of two main streets, parallel, in a northerly and southerly direction, with a number of cross-streets between them. It chiefly lies along the margin of an abrupt elevation or plateau, a little distance back from the Hudson river, which is here a rapid stream without overflowed banks. It is in an extensive rolling plain surrounded by low hills some miles distant. The village, of nearly 3,000 population, has wide, cleanly streets, with houses generally well built in neat and roomy yards, very few being of a poor class, and the place has a remarkably clean and attractive appearance. It seems to have every facility for perfect ground drainage, but of this Mr. Wilson will report more accurately. It has no public water-supply, yard-wells being altogether used. Nor is there any attempt at drainage. Few houses are said to be supplied with excavated cess-pools, house-slops being thrown upon the surface. The ordinary hidden pit is the universal resource.

Of the three cases of diphtheria which occurred in July, and separated by several months from the present epidemic, it need only be said that, occurring in one family, in a tenement occupied by five families, all of them separate in every respect, however, and with the premises not kept in a sanitary condition, they arose from local causes entirely. Mr. Wilson examined these premises, and I refer you to his report.

Of the present outbreak, you will observe that thirteen of the sixteen cases made their appearance from December 13th to 22d. Practically these cases may be said to be simultaneous.

Another point of interest in the study of these thirteen cases is that all but three of them were under ten years of age.

A third feature is that, occurring thus suddenly, the cases appeared in no one locality, but remote from each other. They were for the most part found in the southerly portion of the village, but not in a circumscribed point, nor did those nearest to each other occur in chronological order.

These prominent characteristics, (*a*) sudden outbreak and cessation, (*b*) age of the subjects, (*c*) extended distribution, indicate its dissemination from a common center, as a school, or its general and simultaneous distribution in milk or other article of food. The former, to which attention had been directed before our visit, satisfies the conditions, and was the undoubted cause of a large part of the cases.

This school building was erected last summer, and finished for

occupancy in September. It is a neat wood structure, one story high, on hewn stone foundation, without cellar or basement, and abundantly capacious. It is a primary school, the main school being some distance away. It is in the southern limits of the village, on a site never before occupied, with few buildings adjacent, and with capacious premises. An old cemetery stands on higher ground not far distant. The school seems, in fact, to be built in a depression of the plateau, and below the general surface. Dwellings surround part of the large block in which this burial ground is located. Near the school is a recently dug well. Its water has been found to show evidence of decomposing organic matter in abundance, and I have no hesitation in saying that it was the cause of diphtheria in the cases of nine school children who made use of it. Just this cause has been found in other outbreaks of diphtheria, which I need not cite to you. The school was opened in September and closed on the 18th of December for vacation. It has been advised that further use of this well be discontinued.

There remain several cases which are not to be accounted for in this way. Some of these localities, six in all, I found time to visit. They were all adults, except one, the child of a mother who was herself affected. My belief is that all of these will be found traceable to polluted drinking water. They were in the families of persons of comfortable surroundings, and under general cleanly conditions. In one I found the well, the water of which was declared to be excellent, not fifteen feet from a deep privy vault; here the mother was seriously ill with diphtheria, three small children with others of the family escaping.*

In another case, two members of the family being affected, the well ten feet deep, is close to a stable, and its water at times is said to have an offensive taste. Being now frozen a sample from it could not be procured.

In a family living quite near the school another case was found, and the water of their well will doubtless be found identical with that of the school.

It is well known that polluted water is often used with impunity for a long time and then suddenly becomes operative in producing diphtheria. The causes for this are not altogether clear, but they probably lie in the direction of the persons becoming accustomed to it, and resisting its effects by usage; in the season of the year, since

* See No. 6 of Dr. Hailes' report.

diphtheria flourishes but in the cold months; and in changes in the depth of water in the well, and the concentration of the pollution of the water. It is not now for the first time that this disease has developed in this locality, and it is now more prevalent, chiefly because of the school well affecting so many.

It appears a matter of so much interest to the inhabitants of this village, that a considerable number of samples of water, not only from wells of those affected, but from various parts of the village, were procured, and will be analyzed and reported on to you by Dr. Hailes. Some of these are affected by the cemetery possibly, which is so situated as to favor drainage into them. But in a large village without sewerage and with yard wells, it is not necessary to look for local causes of contamination of wells. The remedy, if found to be needed, you can suggest much better than I am able to do.

Very respectfully,

F. C. CURTIS.

MR. WILSON'S REPORT.

James T. Gardiner, Esq., *Chairman of the Committee on Drainage, Sewerage and Topography of the New York State Board of Health.*

Sir — On the 26th inst. I visited Sandy Hill, and investigated the surroundings of the school-house on John street, and herewith submit the following

REPORT.

Sandy Hill has a population of about 2,800. It is situated on the east bank of the Hudson river, which at this place has considerable fall, and is used as power for manufacturing. The larger portion of the village is situated on a sandy ridge or plateau, a few hundred feet back from the river, which rises abruptly about fifty feet and, about one-half mile back from the river, slopes off gradually to the east. This ridge, which has quite a slope to the south from near the center of the village, runs about parallel with the river. The low land along the river is being built upon for residences, paper-mills, etc. (See appended sketch.)

Underlying Strata.

The ridge in the southern part of the village, in which the school-house complained of is situated, is comparatively flat on top for a

width of about one thousand feet, and is composed of sand to a depth of about eight feet; underlying this is a stratum of hard-pan or cement varying in thickness, but generally about two feet in depth. Below this is a stratum of quicksand from a few inches to four feet in thickness. This is a water-bearing stratum. Below is a bed of tenacious blue clay, about twenty feet thick, below which a water-bearing stratum of gravel is sometimes found, from a few inches to three feet in thickness. Beneath all the above strata is a bed of slate rock, about the thickness of which I could obtain no information. The above data were obtained by inquiry of citizens and well diggers.

Drinking Water.

In the northern part of the village two wells have been bored into the rock to a depth of seventy to ninety feet. One well in the southern end of the village was dug through the clay and no gravel being found was excavated eight feet into the rock, making the well forty-two feet deep.

The general method of procuring water is by digging through the sand and hard-pan into the quicksand, when the water rises from two to six feet in the well. Nearly every house has a well of this kind.

Manner of Disposing of Sewage.

Most of the houses have privies with vaults excavated to, or nearly to, the hard-pan. The slops from the kitchen, etc., are either thrown upon the ground or led away a short distance to a cess-pool, while no provision is made for soakage about stables and manure piles.

General Sanitary Condition.

From the preceding description of the formation it will be readily seen that while on the surface a semblance of cleanliness and healthful surroundings might be maintained, the ground-water and air could be, and doubtless is, in a very unhealthy condition. Owing to the porous character of the soil the liquid and finer portion of the solids soak into the soil and are carried on by the rain and storm-water down to the hard-pan; thence along this impervious stratum, following its inclination until some opening — a well, for example — is reached, when it finds its way into the ground-water, thus polluting not only the well it first enters, but in general the whole underlying ground-water as it moves southerly or toward the river.

Not only are all the residences, with their out-buildings, stables, etc., aiding in polluting the ground-water and air, but an old cemetery — now seldom used — is also a prolific source of pollution in its immediate vicinity and below.

John Street School-House.

This building — shown on the sketch — is about twenty-two feet by forty-five feet, one-story, built the past season, and designed as a ward or primary school for the accommodation of the younger children living in this portion of the village. Drinking water is obtained from a new well dug through eight feet of sand and two feet of hard-pan, situated about fifteen feet from the building, on the east side. There are two privies, without vaults, back of the school-house, and fifty feet or more from the well. The site for this school-house could hardly have been chosen in a more unsuitable location from a sanitary standpoint. It is in a slight depression, bounded by slight elevations of three to ten feet, except toward the south. The limits of this depression are shown approximately in the sketch. The surface of this basin is poor, sandy soil, growing weeds, white birches and other low brush. The slope of the surface toward the south is slight, consequently snow and rainwater runs off slowly and readily soaks into the soil when not frozen. Without a careful investigation by borings and accurate levels it is impossible to give the slope and limits of this basin on the surface of the hard-pan, but from surface indications I have endeavored to show, by cross-shading, the houses that tend to pollute the ground-water at the school-house, in addition to that undoubtedly received from the cemetery, and would attribute said pollution to the following sources: the Cemetery; about forty Dwellings, with Out-Houses and the Decaying Vegetation within the Basin.

The cemetery is on the highest land in its immediate vicinity, although only about five feet above the depression, above referred to, and has a gentle slope toward the east.

In my judgment it is only a matter of time, assuming a normal growth of the village, when the whole soil will be so polluted as to render all shallow wells dangerous as a supply for drinking water. They are now unsafe, and should be analyzed at once and at least once a year afterward, if it is really necessary to rely on them as long as they can be used. The ground air will also become poisoned

and prove deleterious to health, although its effect may, perhaps, be less than that of the water.

PROPOSED REMEDY.

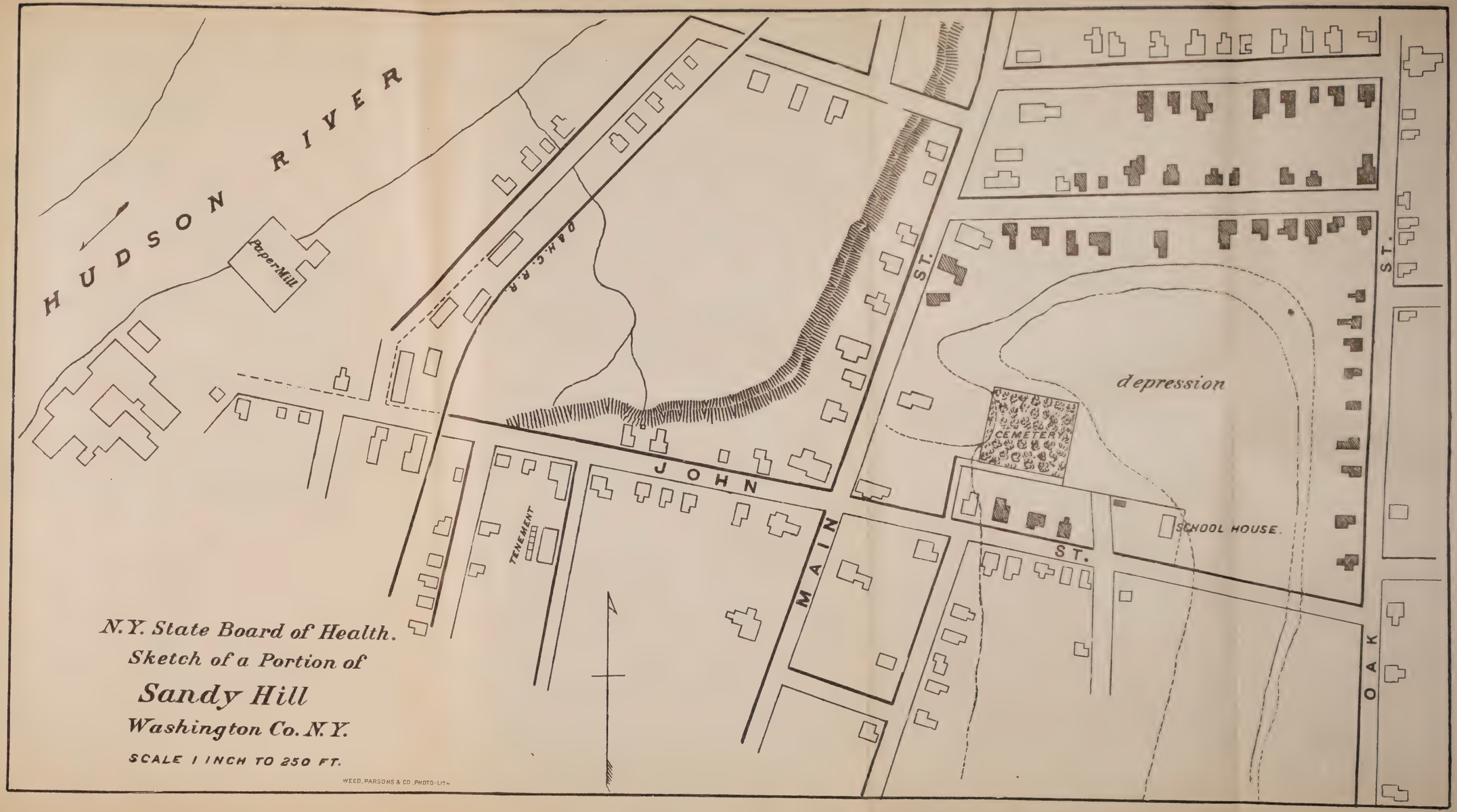
I recommend a water supply, to be brought in from outside. That most readily available is the Hudson river. The Holly system, properly put in, would give satisfactory results. I also recommend a system of sewers, for sewage only, known as the "separate system."

These works would involve a considerable outlay of money, but would be a profitable sanitary investment, as well as a great convenience to all residents of the village.

If any plan for furnishing the village with a water supply seems impracticable, individual citizens could try and improve their drinking water by boring, or driving wells, through the clay to the rock below, but in such wells the surface-water should be cased out. A village ordinance should be passed, and enforced, requiring a proper inspection of such wells, when put in, to see that this casing-out of surface-water is thorough, or the lower ground-water will become polluted. Whether such a supply of water will be feasible, or, if found, unwholesome, can only be ascertained by experiment.

Unless a system of sewers is put in, a change should be made as to the disposal of sewage. The privy vaults should be cleaned and filled with earth, and some of the various methods in vogue adopted for getting the sewage away from the village.

From the casual observation I was able to make, I would suggest that a more thorough inspection of the surroundings of all residences be made. The unusual death-rate in a tenement-house owned by Mr. Howland led me to suspect local causes of water pollution. It is a long two-story house, divided to accommodate five families. (Its location is shown on sketch, just west of the arrow-head.) The privies are in sheds back of the house and about twenty feet from the wells, of which there are four, situated in the cellar bottoms. These cellars are excavated in the sand; the bottoms are wet, and only about eighteen inches above the water surface in the wells, while the soakage from decaying vegetables, meat barrels, etc., pollutes the ground-water so near by. I predict that the test to be made of water from these wells will show them to be highly injurious for drinking and culinary purposes. How many similar cases there may be in the village only a thorough inspection will show.


HUDSON RIVER
Paper Mill
D.H.C. R.R.
ST.
depression
CEMETERY
JOHN
TENEMENT
MAIN
ST.
SCHOOL HOUSE.
ST.
OAK
N.Y. State Board of Health.
Sketch of a Portion of
Sandy Hill
Washington Co. N.Y.
SCALE 1 INCH TO 250 FT.
WEED, PARSONS & CO. PHOTO-LITH.

I believe a system of water supply and sewers the only safe remedy for the evils with which this pleasant village is so constantly threatened.

Respectfully submitted,

O. S. WILSON,

Civil Engineer.

ALBANY, *January* 31, 1885.

DR. HAILES' REPORT.

PATHOLOGICAL LABORATORY, ALBANY MEDICAL COLLEGE,
ALBANY, *February* 9, 1885.

ALFRED L. CARROLL, *Secretary of the State Board of Health:*

DEAR SIR — I have received and examined twenty specimens of water from Sandy Hill, N. Y. Below are the results of a biological analysis.

No attempt has been made to determine the number, nature or species of the micro-organisms, the desire being simply to ascertain approximately the degree of pollution of the various samples of water.

They all show a marked contamination either from surface or soil soakage, and the specimens show, pretty generally, a very large admixture of micro-organisms. Any water open to such sources of contamination is unsafe for drinking purposes, on account of the close relation existing between putrefaction and disease.

WM. HAILES, M. D.,

Albany, N. Y.

TABLE.

No.	NAME AND LOCALITY.	Date of culture.	Time of first appearance of micro-organisms.	Time of liquefaction of surface of gelatine.	Depth of liquefaction on 9th day.	Description of micro-organisms.	No. of colonies in 1 cu. c.	Observations, etc., upon the number, size and microscopic appearances of the colonies of micro-organisms.	Chlorine in parts of 100,000.
		Jan. 31, '85.	days	days	inches				
1	Well of Howland tenement-house (north end), No. 1..	5:15 P. M.	2¾	2½	⅛	....	...	Numerous large and small colonies, pigmented gas.....	1.2
2	Well of Howland tenement-house (north end), No. 3..	"	1¾	3	½	....	...	Numerous medium and small-sized colonies, gas	5.55
3	Well of Howland tenement-house (north end), No. 4..	"	2	3½	⅛	....	...	Numerous large and a moderate number of medium-sized colonies, pigmented.....	1.25
4	Well of Howland tenement-house (south end), No. 5..	"	1¾	3	⅛	....	....	Very numerous small and moderate number of medium-sized nebulous colonies, gas in abundance	2.4
5	Well of Wm. Thomas, Main street (deep well)	"	1½	3	¼	....	....	One very large colony with gas, and very numerous colonies of micro-organisms, very minute..	3
6	Well of Patrick Cox, Main street west of Cemetery...	"	1¾	3	¼		...	Two large nebulous colonies and numerous medium-sized colonies	1.95
7	Well of Mrs. Sweet, Main street opposite P. Cox's ...	"	2¾	8	upon surface	..	. ..	One large colony and a small number of small colonies	10.6
8	Well of Monty Gibson, first house west of school (12 ft. deep, not below hard-pan).....	"	3	5	⅛	...	....	Four large and a few small colonies, light brown pigment.....	4
9	Well of N. E. Packer, second house west of school (well 20 ft. deep).....	"	1¾	3¾	½	....	....	A moderate number of small and medium-sized colonies	1
10	Well of Loran Allen, corner Main and John streets...	"	2⅔	3	entirely	....	...	Exceedingly large colonies, gelatine all broken down	1.8
11	Well of Thomas Glenn, Oak street, east of school .. .	"	2⅔	3	1	....	....	A few large pigmented colonies and a few small ones	7.5
12	Well of Harper Rogers, Elm street	"	1⅔	3	½	....	....	Several large and many small nebulous colonies	3

13	Well of Hiram Allen, corner John st. and Howland's lane	"	1⅔	3	¾	...	...	A few large and a few small colonies	2.6
14	Well of Thomas Norton, Sumpter street	"	1⅔	3½	entirely	....	...	A few exceedingly large colonies, gelatine all broken down	2
15	Well of Mose Le Point, Sumpter street	"	1½	4	1½	...	....	Three very large colonies and a moderate quantity of medium-sized colonies	3
16	Spring of Thomas Norton, Sumpter street	"	2¾	3	2	....	...	Four very large colonies, ½ inch in diameter	2.65
17	Spring of J. F. Mosher, in rear of house	"	1⅔	3½	¾	...	...	A few large and many medium and very small-sized colonies, lightly pigmented	2.5
18	Well of A. Kingsley, 22 ft. deep, privy 50 ft. distant	Jan. 6, 1885 11 P. M.	2½	3	⅛ on 3d day	. .	....	Very numerous medium-sized colonies, nebulous slightly pigmented gas	s 2.4
19	Well of Middleworth house, privy 50 ft. distant	....	2½	3	⅛	...	....	Fifteen distinct large colonies, also a few small ones	s10.8
20	Water from school-house	.....	1¼	2	1½	....	....	Exceedingly numerous nebulous colonies; bacterium termo and very numerous short rod bacilli.	-

SANITARY CONDITION OF CANAJOHARIE, N. Y.

STATE BOARD OF HEALTH OF NEW YORK,
ALBANY, *June* 25, 1885.

To the Board of Health of Canajoharie, N. Y.:

GENTLEMEN — In response to the complaint made to this Board of a nuisance existing in your village which ought to have been abated by the local authorities, a sanitary inspection of Canajoharie was ordered and Mr. O. S. Wilson was sent to make the inspection. His report on the sanitary condition of the village is herewith transmitted for your information with the hope that you will use every effort to remedy the evils which are pointed out.

On behalf of the Board,
ERASTUS BROOKS,
Committee on Drainage, Sewerage and Topography.

INSPECTOR'S REPORT.

To the Chairman of the Committee on Drainage, Sewerage and Topography of the New York State Board of Health:

SIR — In accordance with your instructions I visited Canajoharie April 30th to investigate a complaint made against a privy in that village. As it is only one of the many nuisances existing there, I submit the following report on the

SANITARY CONDITION OF THE VILLAGE.

It is an old settlement situated at the foot of and upon the bluff on the south side of the Mohawk river at the mouth of Canajoharie creek. The population is about 2,000.

There are two private water companies which supply water to a small portion of the inhabitants. The main dependence is upon ordinary wells, especially in the lower portion of the village where the land is nearly level and saturated with sewage from cess-pools and privy vaults. There is a pipe sewer from the foot of the bluff along street, emptying into a covered State ditch on the south side of the canal. This sewer was put in for storm water, but takes sewage from several places. It became offensive, but is now flushed occasionally during warm weather with a hose from a fire hydrant turned into the upper end. This sewer should be continued to the river and would then answer for the main outlet sewer for the village, which needs a system of sewers very badly. There are few private sewers emptying into the creek.

NUISANCES ON STATE LAND.

In the early days of the canal Canajoharie creek, in the village, was used as a place for loading and building boats, but was abandoned forty years ago. During the warm summer months the water is very low in the creek with little or no surface current. Along this creek, especially on the west side between Little Mohawk and

Mill streets, the people living along the bank and a few others throw ashes and garbage into the canal bed. High water carries some of this down stream, but at present there are about one hundred wagon-loads of material, mostly ashes with several loads of manure from a stable and all sorts of garbage and filth deposited along the creek above the water surface, creating a stench and a nuisance. I would suggest that your honorable Board order the local board of health to have this material cleaned out at once. The people living on the bank should bear the expense.

Along the berme bank of the canal in the west end of the village there are a number of pig-stys that are a nuisance. I would suggest that the Superintendent of Public Works be requested to order them taken off at the owners' expense.

OTHER NUISANCES.

There are at least fifty places in the corporation where swine are kept, some of which have been complained of. They should all be removed from the village. An ordinance should be passed and enforced forbidding swine to be kept within, or within a certain distance of, the corporation, as it is practically impossible to keep swine in a village without causing a nuisance.

Little attention seems to be paid to the ordinance requiring all privy vaults to be cleaned every spring. The local health officer recently appointed seems to see the necessity of improving the sanitary condition of the village. The local board of health should be more active. If the above statements do not prove this, I will add that there are several houses in the west end of the village without privies or cess-pools, where slops and garbage are thrown into the streets and upon the land of the West Shore railroad opposite. I take pleasure in stating that the privy complained of has been cleaned within a week under orders from the local health officer. There are about three hundred more that need attention.

Respectfully submitted,

May 8, 1885. O. S. WILSON, *C. E.*

SLAUGHTER-HOUSE NUISANCE AT JORDAN.

STATE BOARD OF HEALTH OF NEW YORK,
ALBANY, *June* 25, 1885.

To the Board of Health of Jordan, N. Y.:

GENTLEMEN — In response to the complaint concerning a slaughter-house in the village of Jordan, inspection was ordered by this Board. The report of Mr. O. S. Wilson is herewith transmitted for your information with the recommendation that the local board of health take the necessary means to abate the nuisance substantially as pointed out in the report of the inspector.

On behalf of the State Board of Health,

ERASTUS BROOKS,

Committee on Drainage, Sewerage and Topography.

INSPECTOR'S REPORT.

To the Chairman of the Committee on Drainage, Sewerage and Topography of the New York State Board of Health:

SIR — In accordance with your instructions, I inspected the slaughter-house of Crofut Brothers, at Jordan, May 7th, and report as follows:

It is an old structure within the corporation, and has been used more or less constantly for slaughtering animals for many years. About 800 to 1,000 cattle, 1,000 hogs, besides sheep, veal, etc., are slaughtered here annually, at least eighty per cent of which is sold and used in Auburn. The building with the accompanying pig-pens are situated close to the edge of Skaneateles creek on low land, and can hardly be arranged to prevent it being a nuisance. Part of the winter accumulation of refuse, including ten ton of bones, has been recently removed. It is still far from being in good sanitary condition. While a slaughter-house may be a necessary adjunct to a village, it seems wrong that so many animals should be slaughtered in the corporation of Jordan for the Auburn market. There is another firm selling meat in Jordan, having a slaughter-house within the corporation but below the main portion of the village. I heard no complaint against that, however. When the Messrs. Crofut opened a market in the village recently it had the effect of reducing the price of meat to the consumers about twenty-five per cent, so while many desire to have the slaughter-house removed or put in better sanitary condition, there is no desire to drive their market from the village.

It is, in my judgment, impracticable to render the present building and site unobjectionable for slaughtering purposes, and it should be removed if the village authorities really desire to have good sanitary surroundings.

It would be unjust after making the statement above not to call attention to the unsanitary condition of the rest of the village. Nearly every place shows the need of better sanitary inspection and the enforcement of well-recognized sanitary ordinances. A drain in the main business portion of the village, laid to carry off storm water and emptying into the canal feeder, is polluted by the slops from the hotel owned by the president of the board of trustees, and is a nuisance, in violation of State and village laws. Several privies empty into the canal contrary to said laws.

The local board of health seems careless and unwilling to do its duty lest it meets with opposition and trouble as well as loss to its private interests.

Respectfully submitted,

O. S. WILSON, *C. E.*

May 9, 1885.

POLLUTION OF L'HOMMEDIEU CREEK.

Complaint.

Hon. EDWARD M. MOORE, *President Health Commissioners, Albany, N. Y.:*

DEAR SIR — On the 23d day of August, 1884, there was presented to the board of health of the town of Montour, in Schuyler county, New York (village of Havana), a notice, a copy of which is hereto annexed and marked Exhibit "A."

Thereafter the board of health of the said town took action and declared the offense complained of a *nuisance*, but the same was not, nor has it since been, abated. The local board's action is set forth in a letter from the town clerk of the town of Montour, who is its secretary, a copy of which is hereto annexed and marked Exhibit "B."

The situation and location of the *nuisance* is shown in the annexed Exhibit "C," which also shows the distance of several residences of those who made the complaint as well as the other dwellings contiguous.

The residences designated have been occupied for years, and all are surrounded by improvements, some of them of an elaborate and expensive character.

Attention is called to the affidavit of Jerome C. Dutcher, hereto annexed and marked exhibit "D," showing the offensiveness of the *nuisance* and the pollution by it of the waters of L'Hommedieu creek.

The parties maintaining and operating this *nuisance* do not live on the same premises. It was moved and placed thereon by them during the last season. The local board, after coming to the same conclusion reached by your petitioners, seem paralyzed in action, and we call the attention of the State Board to the fact, and respectfully ask its intervention.

Dated HAVANA, N. Y., *February* 5, 1885.

HULL FANTON,
A. O. WHITTEMORE,
A. G. BALL,
F. P. BUTTS,
J. C. DUTCHER.

EXHIBIT "A."

To the Board of Health of the town of Montour, State of New York:

GENTLEMEN — A slaughter-house is maintained by the Messrs. Dibbles in the vicinity of the residences of the undersigned. It is offensive and we believe a cause of danger and an injury to the public health.

Dated *August* 22, 1884.

(Signed)

HULL FANTON,
A. O. WHITTEMORE,
J. C. DUTCHER,
F. P. BUTTS,
A. G. BALL.

EXHIBIT "B."

HAVANA, *February* 4, 1885.

HULL FANTON:

DEAR SIR — I will give you the report of the committee of the whole, given at a board meeting, held September 5, 1884, in regard to the slaughter-house of Dibble Brothers.

The committee of the whole reported that after examining the aforesaid premises, and conferring with the Dibble Brothers, they agreed to remove the said nuisance, and clean the premises, according to the suggestions of the health officer of said board.

Moved, The adoption of the committee's report, and that the health officer see that the suggestions are carried out. Carried.

Adjourned to meet September 13, 1884.

There was no further action taken in the matter by the board.

C. M. MARSH,
Secretary.

EXHIBIT "D."

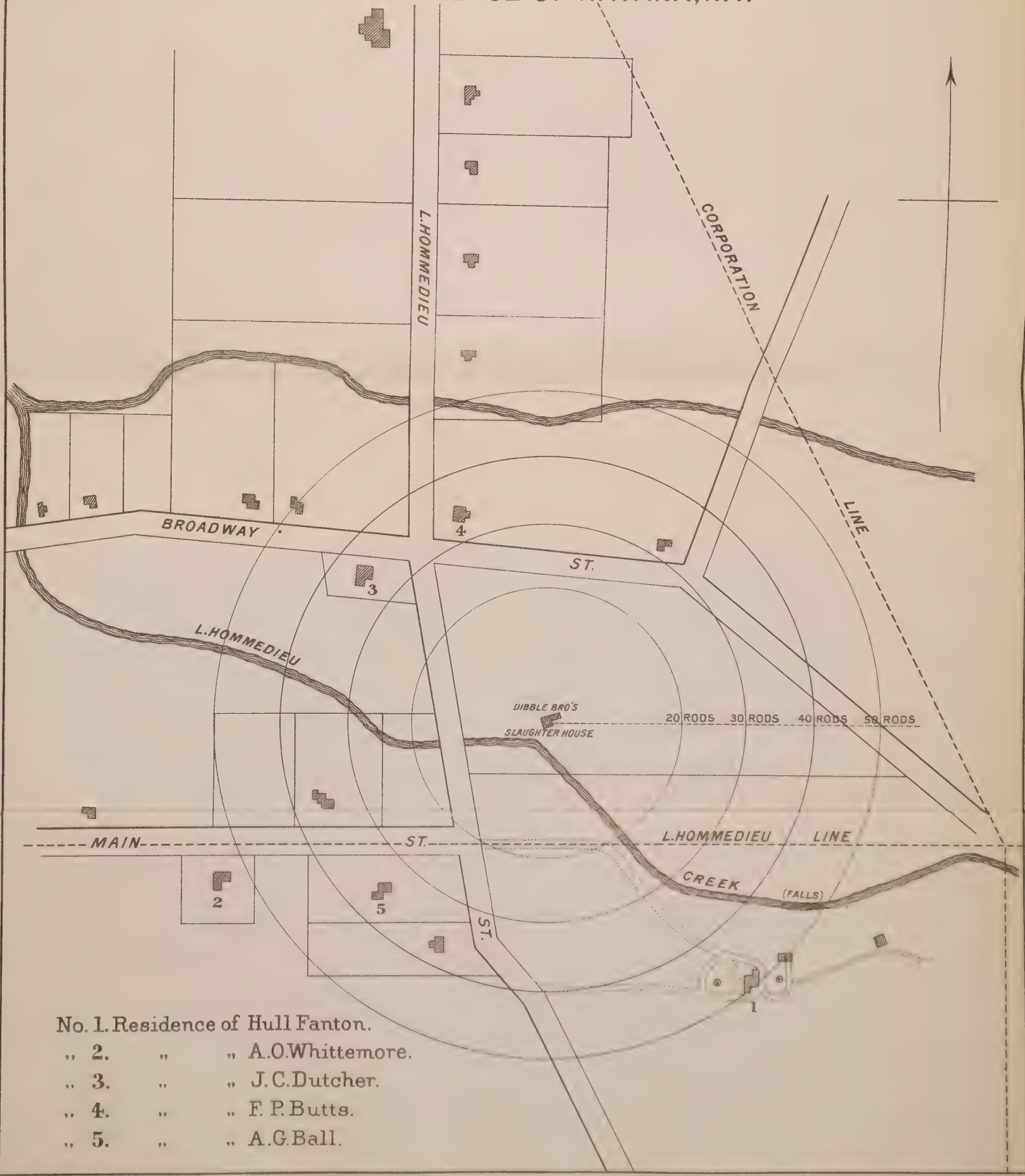
STATE OF NEW YORK, }
County of Schuyler, } *ss.:*

Jerome C. Dutcher, of the village of Havana, in the town of Montour, in said county, being duly sworn, deposes and says that he has been a resident of said village for nineteen years last past; that during the three years last past he has resided in the east part of the village of Havana, on the street known as Broadway, and between said street and the creek known as L'Hommedieu creek; on the map, that has been exhibited to deponent in connection with the "Dibble Brothers' slaughter-house," his place of residence is correctly indicated, at the corner of Broadway and L'Hommedieu streets, and is marked No. 3; deponent is the owner of the vacant land to the south and west of said indicated lot, and is also the owner of the second and third village lots (shown on the map) west of L'Hommedieu street, and on the north side of Main street; on one of these lots he is now engaged in building a dwelling, the foundation of which is now up.

This deponent further says, that previous to the establishment of the slaughter-house mentioned, the water of L'Hommedieu creek was usually clean and wholesome, and his horse and stock drank of it; that after the slaughter-house was fairly under way the water of the creek became so polluted and bad that the horse would not drink of the water at all, and the stock only when compelled by great thirst; that he has tested other horses by having them taken to the creek, and they likewise refused to drink, the same as his own horse; the polluted water, so far as this deponent can discover, has no perceptible bad odor; almost daily, when passing in the vicinity of the slaughter-house named, particularly during the warm season or when a little moist, the offensive odors emanating, as this deponent verily

EXHIBIT "C".

PART OF VILLAGE OF HAVANA, N.Y.



No. 1. Residence of Hull Fanton.
„ 2. „ „ A.O.Whittemore.
„ 3. „ „ J.C.Dutcher.
„ 4. „ „ F.P.Butts.
„ 5. „ „ A.G.Ball.

believes, from the said slaughter-house are bad and offensive in the extreme.

JEROME C. DUTCHER.

Sworn before me, this 5th day of February, 1885.

A. G. BALL, *Notary Public.*

REPORT OF STATE BOARD.

STATE BOARD OF HEALTH OF NEW YORK,
ALBANY, *June* 25, 1885.

To the Board of Health of Havana, N. Y.:

GENTLEMEN — In response to the complaint by prominent citizens within the village limits and in the immediate neighborhood of the residence, the State Board of Health sent an inspector, Mr. O. S. Wilson, to examine the locality.

Mr. Wilson reports that the slaughter-house is a nuisance to the neighborhood, and that it should be abated. We, therefore, transmit to you the report of Inspector Wilson with the request that the nuisance be abated at an early day.

On behalf of the Board,

ERASTUS BROOKS,
Chairman of Committee on Drainage, Sewerage and Topography.

To the Chairman of the Committee on Drainage, Sewerage and Topography of the New York State Board of Health:

SIR — Acting under instructions from you, I visited Havana May 1st and inspected the slaughter-house owned and operated by the Dibble Brothers, against which complaint was made, and submit the following report:

Said slaughter-house formerly stood about half a mile further north, near the marsh. It was complained of and removed to its present site.

It is situated on low ground and, at present, is not attractive in appearance and is, no doubt, objectionable to people living in the vicinity.

It has not been kept as clean as it should have been, but the owner promises to keep it in better condition if allowed to remain, and claims no objection was made at the time it was moved there.

About three head of cattle and twice as many sheep and swine are slaughtered weekly for the local market. It is within the corporation, contrary to a village ordinance. It is, in my judgment, a matter with which the village authorities are able to deal, and I would respectfully suggest that your honorable Board instruct the local board to see that this, as well as the numerous other nuisances within the corporation referred to in my report of January last and toward remedying which nothing has yet been done, are abated. It would, perhaps, be unfair to single this out for action when so many nui-

sances abound, some of the complainants themselves maintaining nuisances. There is no immediate danger to be feared from this nuisance, but it should be carefully watched by the local health officer, when one is appointed, to see that it is kept in as good sanitary condition as possible.

When the village authorities awake to the necessity of a thorough sanitary inspection and improvement of the village, the ordinance respecting slaughter-houses should also be enforced.

Respectfully submitted,

O. S. WILSON, *C. E.*

May 9, 1885.

REPORT CONCERNING COMPLAINT FROM THE BOARD OF HEALTH OF WELLSBURG, CHEMUNG COUNTY.

To the State Board of Health:

GENTLEMEN — As directed by you and in response to a request from the local board of health of Wellsburg, I have made a personal examination of the house that is the subject of their communication to you, and herewith submit my report as to the conditions discovered by me.

I find the report of the health officer, as to the squalid and filthy condition of the log-house complained of, to be substantiated in every particular, excepting that I could not find any evidence of the accumulation of excremental matter within the house.

Accompanied by the constable, I was admitted to the house by Mrs. Burk, after a little delay, and at once found that the lantern which we had procured was an essential aid to the examination. The interior of the house is divided by rough board partitions into several compartments, the largest of which receives a little light through the grimy panes of a small window and through the crevices between the logs. Heaps of dirt, apparently the accumulations of years, were gathered up in places and entirely prevented us from opening the little-used front door.

An open well, just within the back door, was evidently in constant use, though it cannot fail to receive a certain amount of the filthy washings from the floor, which is very uneven and apparently is formed of boards laid directly upon the earth.

A rough board ceiling, placed over the living rooms of the cabin, is perhaps the most effective roof, as the shingles are off from the roof above in many places, and the whole roof appears about to fall.

An inner room, which serves as kitchen and bed-room, and is perhaps eight by ten feet in size, was in nearly total darkness.

The bedding and all else in this room was in an indescribably filthy condition. The cooking-stove placed close to the bed probably prevents the occupants from suffering with cold in severe weather.

Mrs. Burk seemed incapable or reluctant to make intelligible answers to questions put to her; her singular life of absolute seclusion from light and fresh air and all converse with the inhabitants of the

village will perhaps account for her reticence, though such a life might well be sufficient to unsettle her mind.

The near neighbors of Mrs. Burk testify that they have not seen her for years, the constable with me had never seen her before, and her appearance and peculiar complexion indicated a life of imprisonment in darkness and filth. Whether Mrs. Burk's seclusion is voluntary or not cannot be ascertained from her, but the fact is testified to by her neighbors that she has not been seen out of her home for ten years.

The house was pervaded with a close and sickening smell arising from the filthy floor, the bedding and clothes long unwashed, from various accumulations of rotting vegetables in barrels and the decaying woodwork of the cabin. As far as I was able to understand Mrs. Burk's nearly unintelligible words, she was feeling ill and rheumatic, and would be willing to have her condition improved.

There is no privy attached to the house, and excremental matter is probably thrown out into the yard, where crops are now growing, for no accumulations of such substances were discovered.

While Mrs. Burk remains inclosed in solitude within her dismal abode, Mr. Burk, on the other hand, is said to spend but little of his time at home, and his neighbors certify that the vile smell and the lice which he brings from his filthy cabin into their shops and hotels are exceedingly annoying to them.

The annexed sketch shows that the log-house stands directly upon Front street, the main street of the village, and is surrounded with others of a far better class.

It is the testimony of the near residents that, in suitable conditions of the atmosphere, the sickening odors from the house are plainly evident to passers-by.

It would seem that the circumstances will justify the declaration that the house in question is a public nuisance in its present condition, and that it should no longer be tolerated as it is. The opinion of Mr. J. D. Hammond that the building is not worth repairing is amply justified, and it would seem, moreover, that only prolonged exposure to the action of air and sunshine can ever rid it of its accumulations of vileness.

It would be advisable to burn a sufficient quantity of sulphur within the house to destroy vermin concealed in its crevices, after first stopping up the holes as well as possible. This process should be repeated after a few days, in order to exterminate such insects as may hatch out after the first smoking. All articles of bedding and wearing apparel now within the house should share in the fumigation.

After the destruction of the vermin, which would otherwise invade the neighborhood, the owner's cheapest and best method of cleansing the premises would consist in the entire removal of the cabin, which is no longer a fit habitation for human beings.

Very respectfully yours,

HORACE ANDREWS.

ALBANY, *August* 10, 1885.

SECRETARY'S RETURN.

ALBANY, *August* 13, 1885.

ABNER C. WRIGHT, Esq., *Secretary Board of Health, Wellsburg, N. Y.:*

DEAR SIR — I transmit herewith a copy of a report by Inspector Horace Andrews, C. E., on the condition of the premises occupied by Burk and his wife, referred to in a previous communication from your board. In view of the facts stated by Mr. Andrews and of the close proximity of the hovel in question to neighboring habitations, I am of opinion that it clearly falls within the category of nuisances which sanitary authorities should order to be abated.

If the danger to health arose solely from accumulations of filth created by the tenants themselves, they could be compelled to remove these and to observe such rules of sanitary cleanliness as your board should prescribe; but if, as seems to be the case, insanitary conditions be inherent in the building itself, the owner, not the tenant, is responsible for these and should be ordered to abate them. In the present instance it is stated that no repairs or alterations can remedy the essential defects in the structure or render it fit for human habitation; if so, the owner can be directed to remove it altogether, in which case the eviction of the tenant would be a necessary part of the procedure, and the fumigation of the premises could be substituted by their destruction.

Wherever such a tenant may live, he is likely to create a nuisance, and should be compelled to obey sanitary regulations.

I am, sir, faithfully yours,

ALFRED LUDLOW CARROLL, M. D.

COLD SPRING PUMP

Complaint.

WEEDSPORT, *November* 12, 1884.

To the Board of Health of the State of New York:

Herewith please find petition to board of health of town of Brutus and the action thereon in which the needful facts are stated and set forth, except as to efforts heretofore made, to have the evil remedied. These are that application has been made to the section canal superintendent and other canal officers to have a remedy applied by lowering the culvert under the bridge approach and, though its necessity has been admitted and promised at different times, fails of being applied, and, therefore, the action of your Board and its authority is respectfully invoked that the declared nuisance may be abated and its cause remedied, and your petitioners will ever pray.

In behalf of petitioners, respectfully submitted,

WILLIAM I. CORNWELL.

To the Board of Health of the town of Brutus:

The undersigned, citizens and residents of said town, respectfully represent that a public nuisance exists upon lot No. 57, in said town, prejudicial to health, caused by an embankment and approach to a bridge spanning the Erie canal at Cold Spring pump, and an insufficient culvert to permit the flowing off of water falling upon the surface of several hundred acres of land, and which accumulates upon some eight to twelve acres lying westerly from said embankment and southerly from and adjoining to the canal, where it remains, stagnates and saturates the land until evaporated, producing malaria, causing sickness and converting what would otherwise be good cultivatable land into a flag-hole of several acres, and which can be effectually remedied and abated by lowering the culvert in or under the bridge approach and the ditch leading to the culvert under the canal. Therefore, the exercise of your authority is invoked that the remedy may be applied, and your petitioners will ever pray, etc.

Dated *August* 1, 1884.

ELIJAH S. DRAKE,
JAMES E. CARR, M. D.,
HILAND A. WEED, M. D.
JOHN PERRY,
E. H. BATES,
JOHN G. BRADT,
CARLOMAN COPP,
WILLIAM D. ABBOTT,
I. T. MEECH,
GEORGE W. COLE,
F. L. DINGMAN,
G. E. TOWNSEND,
G. W. GARLAND,
A. W. ABBOTT,
E. O. BONTA,
W. W. ROCHE,
CHAS. E. ROBILLARD,
CHARLES P. DATTEN,
THOMAS C. WARD,
O. N. EVERTS,
WILLIAM. M. BRADLEY.

To the Board of Health of the town of Brutus:

The undersigned, health officer of said town, respectfully reports that he has examined the premises specified in the annexed petition, and inquired into the matter stated therein, and finds the facts relative to said premises, their location, accumulation and standing of water thereon, and causing a marshy flag-hole of several acres to be, as stated in said petition, and the same is undoubtedly productive of malaria, likely to affect the health of citizens in its vicinity, as it is certified to have done by Messrs. Carr and Weed, physicians prac-

ticing in that neighborhood; that he also finds that, while the State constructed a ditch and a culvert under the canal bridge approach to carry off the surface waters that must necessarily accumulate on said premises, their flow being obstructed by the embankment of the Erie canal, as well as those leading from the canal, the culvert under the bridge approach is at an elevation that does not permit of their being carried off, and that the *lowering* of that culvert would be an *efficient* and the *only* remedy for what is now a public nuisance, there being a culvert under the canal, a short distance east of the bridge, ample for carrying off the water.

Respectfully submitted,

E. O. BENEDICT,

November 6, 1884. *Health Officer, town of Brutus.*

At a meeting of the board of health of the town of Brutus, held at the office of D. C. Knapp, in the village of Weedsport, on the 6th day of November, 1884: Present, Levi T. Hamilton, supervisor; Francis L. Batchelor, Darwin C. Knapp, Milton Reede and Dwight Cady, justices, and David W. Shaw, town clerk. Health officer E. C. Benedict made a report as to the matters contained in the petitions of Elijah S. Drake, James E. Carr, M. D., Hiland A. Weed, M. D., and others, which had been theretofore referred to said health officer for investigation, whereupon, on motion of Mr. Batchelor,

Resolved, That the matter complained of in said petition, and specified therein, and in the report of said health officer, is a public nuisance.

I hereby certify the foregoing to be true copies of the originals on file in this office, and of the whole thereof.

DAVID W. SHAW,

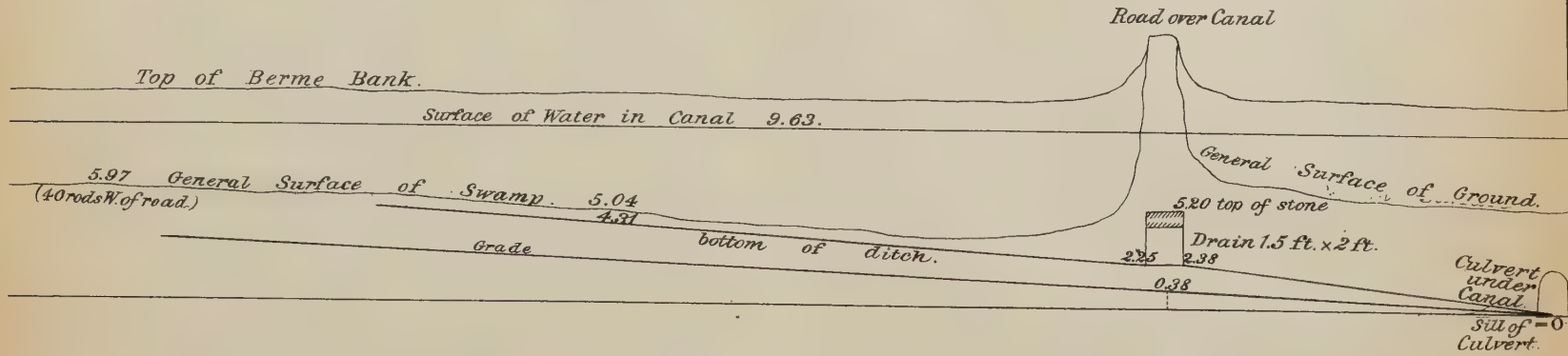
Town Clerk of Brutus, N. Y.

REPORT UPON A NUISANCE CAUSED BY SWAMP LANDS AT COLD SPRING PUMP, TOWNSHIP OF BRUTUS, CAYUGA COUNTY.

JAMES T. GARDINER, Esq., *Chairman of the Committee on Drainage, Sewerage and Topography:*

SIR — I have recently examined into the causes of complaint made in a petition from certain residents of the township of Brutus, Cayuga county, and have taken levels to ascertain whether the means of relief suggested in the petition were practicable. My report concerning the facts ascertained is herewith submitted. The accompanying sketch shows the general location of the swampy lands mentioned in the petition. The surface of the land immediately south of the Erie canal and lying just west of the dividing line between Cayuga and Onondaga counties is quite flat, and the natural drainage is to the northward.

The surface of the water in the Erie canal is three or four feet higher than the land to the south, and the natural drainage of the



Approximate Section along the South side of the Erie Canal at Cold Spring Pump.

country in the vicinity of Cold Spring pump is carried under the canal by a substantial and effective culvert, lying a few rods west of the county line. There is a piece of low and swampy land lying between the canal and the first road to the south of it, and between the first and second roads west of the county line, as shown on the sketch, which receives the drainage from a water-shed estimated at 400 acres. The area of the swamp is from eight to twelve acres, and it is for the most part quite wet, being covered with cat-tails and sedge-grass at places, and, to some extent, with trees.

The only means of draining the swamp referred to is a ditch flowing to the eastward, parallel to the berme bank of the canal, and passing under the north and south road at Cold Spring pump, through a drain eighteen inches wide and twenty-four inches deep. This ditch flows under the canal through the culvert before referred to, about 300 yards east of the road.

It is claimed by the inhabitants residing in the vicinity of the swamp that numerous cases of sickness have been caused by its malarious influences, and the physicians of the neighborhood are willing to make affidavit to the fact. The further claim is made that the State, by constructing the canal, has obstructed the natural drainage, and that the culvert provided under the road to the east of the swamp is improperly constructed, and cannot give means for the drainage of the swamp.

In order to verify the latter claim, I have taken levels which indicate upon the accompanying profile the relative height of the land and road culvert. It is seen that the ditch west of the road is very shallow, and that it cannot be deepened sufficiently to drain the adjoining land unless the drain passing under the road is placed at a lower level. Moreover, the drain under the road is of too small size to allow the surface drainage from so extensive a water-shed to escape freely; it is in fact adapted to receive the canal leakage and not much beside. It would seem as if the drain under the roadway had been constructed without due consideration of the extent of territory which must drain through it.

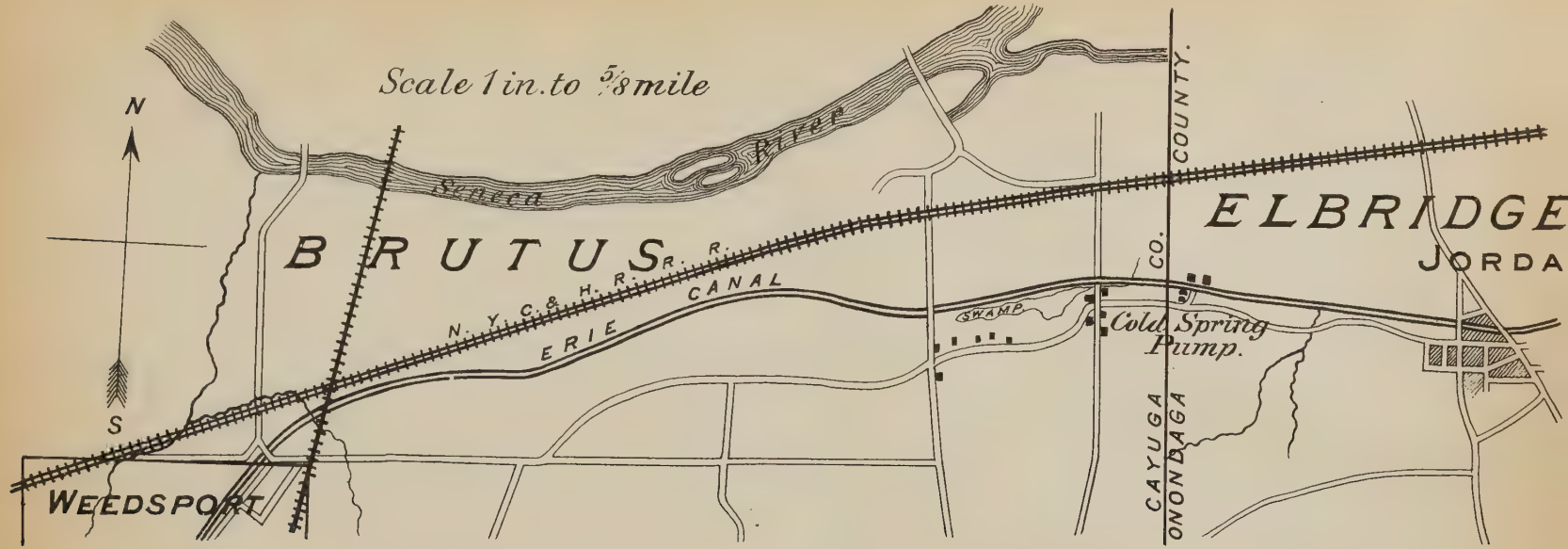
Under the circumstances it would seem that the State would be amply justified in enlarging and deepening the culvert under the roadway, and in clearing out and deepening the ditch at the foot of the berme bank. I would recommend that the bottom of the drain be lowered two feet below its present level, and that the drain be made at least two feet wide and three and a half feet deep. The ditch could then be dug to a depth of two feet to three feet and, with the lateral drains which the inhabitants agree to dig, the swamp could easily be reclaimed and placed in a good sanitary condition. Further to the west, along the canal, land that was originally swampy is now drained and is arable. The swamp complained of is stated to be in a much worse condition than before the canal was constructed, and the natural drainage prevented. As the swamp has been covered with trees till within a few years, no attempts have ever been made to cultivate the land.

The expenditure required to make the improvements suggested would be slight, and it would appear as if the State was in equity bound to furnish the inhabitants with the relief for which they have petitioned.

Very respectfully yours,

HORACE ANDREWS, JR., *C. E.*

ALBANY, *December* 4, 1884.


Scale 1 in. to 5/8 mile
N
S
Seneca River
BRUTUS
N. Y. C. & H. R. R. R.
ERIE CANAL
SWAMP
Cold Spring Pump.
CAYUGA CO.
ONONDAGA COUNTY.
ELBRIDGE
JORDA
WEEDSPORT

FOOD AND DRUG AND BEER LAWS.

REPORT

OF WILLIS G. TUCKER, M. D., PH. D.,

ANALYST OF DRUGS.

To WOOLSEY JOHNSON, M. D., *Chairman of the Sanitary Committee of the State Board of Health of New York:*

SIR. – At a conference of the analysts, with the members of the Sanitary Committee, held in Rochester, July 30, 1885, the examination of drugs and medicinal substances generally, but more particularly of the officinal drugs and preparations of the United States Pharmacopœia, exclusive of the vegetable alkaloids and those preparations into which they enter, was assigned to me. The collection and examination of samples was begun September 1st, and I transmit herewith a report on the work done from that date to the present time. It was agreed that the analysts should engage their own collectors and, with the exception of a few samples purchased by myself, the articles examined by me have been collected under my direction by my assistant, Mr. A. G. Losee. The total number of samples collected and examined was 194, and the average cost of these samples, including collector's *per diem* and expenses, was a fraction over twenty-two cents.

In the selection of articles for examination, rarely used and unimportant drugs were excluded, and regard was had to the results previously obtained by analysts in this and other States, those articles most likely to be purposely adulterated, of inferior quality or impaired by age, being selected, that no time might be wasted in the examination of articles seldom prescribed or almost invariably pure. Preference was given to such articles as have a definite standard of purity assigned to them in the United States Pharmacopœia, since that work is particularly recognized in the Food and Drug Adulteration Law of 1881, and the pharmacopœial tests and analytical processes were commonly followed. Exhaustive analyses were not generally made, since they would have consumed much time to little profit, and limited the number of samples examined, but in the majority of instances at least one quantitative determination was necessarily made. All samples examined have been bottled and fully labeled, and the portion remaining upon the completion of the analysis has been preserved and full records of the same kept. Reports have been made to the Secretary of the Board, at the close of each month, upon the work done during the preceding month, and these have been accompanied with separate reports upon each sample examined.

Of the 194 samples examined 120 were of officinal drugs and preparations, and 74 of vinegar, which, although it has been dismissed from the United States Pharmacopœia at the last revision (1880), is still retained in those of most other countries. Vinegar, therefore, although generally classed with foods, may yet be considered a drug, and it having moreover been agreed that the analysts should not necessarily be restricted to the fields assigned them, and it being deemed advisable, for various reasons, to begin an investigation as to the quality of the vinegar sold in this part of the State, a number of samples were collected and examined, and it is proposed to continue this investigation by the collection of further samples in other localities.

I. DRUGS.

Of the 120 samples of drugs examined, 50 were procured in Albany, 27 in Troy, 20 in Hudson, 12 in Schenectady, and 11 in Amsterdam. With the exception of 12 samples of cream of tartar purchased at groceries they were all obtained at drug stores. Of the total number there were rated as of

Good quality	59 or 49.2 per cent.
Fair quality	35 or 29.2 per cent.
Inferior quality	23 or 19.1 per cent.
Sold by error	3 or 2.5 per cent.

Those classed as of "good quality" practically conformed to the requirements of the United States Pharmacopœia; those of "fair quality" fell not far below those requirements, while those rated as "inferior" were entirely fictitious (as in the case of some of the cream of tartars) or of very poor quality. In three cases the article sold did not consist of the substance called for.

The following were the articles examined:

Citric Acid. (*Acidum Citricum*, U. S. P.)

Three samples examined. Nos. 1, 4 and 11. Percentage purity respectively 99.73, 99.76, and 97.91. All of fair quality, containing traces only of metallic impurities.

Tartaric Acid. (*Acidum Tartaricum*, U. S. P.)

Four samples. Nos. 2, 10 and 59 of fair quality, containing traces of metallic impurities. Percentage purity respectively 97.82, 99.67 and 98.00. No. 3 consisted of *cream of tartar* of good quality, doubtless sold by mistake.

Iodide of Potassium. (*Potassii Iodidum*, U. S. P.)

Three samples, of which Nos. 5 and 8 were of fair, and No. 65 of good quality.

Bromide of Potassium. (*Potassii Bromidum*, U. S. P.)

Three samples, of which Nos. 6 and 7 were of fair, and No. 66 of good quality.

Santonin. (*Santoninum*, U. S. P.)

One sample, No. 9, which was of good quality.

Cream of Tartar. (*Potassii Bitartras*, U. S. P.)

Twenty-two samples, of which 10 were purchased at drug stores and 12 at groceries. Of the former *all* were real cream of tartar, 9 being of good, and 1 of fair quality. The percentage purity of these samples was as follows:

No. 12	87.19
No. 13	97.70
No. 14	94.92
No. 15	97.43
No. 16	97.80
No. 17	97.78
No. 48	97.67
No. 49	95.63
No. 50	98.73
No. 69	97.58

Average purity, 96.24 per cent.

Some of the commercial cream of tartar now sold is of an extraordinary degree of purity, there having been a great improvement in this respect during the last few years.

Of the 12 samples purchased at grocery stores, 2 were of good, 1 of fair, and 1 of inferior quality, while 8 were grossly adulterated or entirely fictitious. The percentage purity of the four first named was as follows:

No. 19	92.26
No. 20	81.47
No. 54	96.87
No. 56	79.31

Average of these four samples of real cream of tartar, 87.48 per cent, being much below that of the preceding samples obtained from drug stores. The remaining eight were made up as follows: Nos. 18, 21, 22 and 51 consisted chiefly of acid phosphate of lime and starch; No. 23 of sulphate of lime, starch and some cream of tartar, the acidity corresponding to 13.24 per cent; Nos. 52 and 53 consisted chiefly of sulphate of lime, starch and tartaric acid, the acidity of these samples corresponding to 31.57 and 30.56 per cent of cream of tartar, and No. 55, which was mainly sulphate of lime with some tartaric acid, with an acidity corresponding to 19.20 per cent.

The number of samples examined is too small and the territory in which they were collected too limited to base conclusions of much value upon the results obtained, though it would appear that a pure article is much more likely to be sold by the druggist than the grocer, whose so-called cream of tartar is often a mere imitation, and a very poor one at that.

Alcohol. (*Alcohol*, U. S. P.)

Six samples, Nos. 24, 25, 26, 27, 28 and 29; all were of good quality. The U. S. P. requires "91 per cent by weight of ethyl-alcohol." The percentage in these samples was respectively 91.14, 90.12, 90.16, 90.37, 90.30 and 90.87. Average, 90.49 per cent.

Stronger Ether. (*Aether Fortior*, U. S. P.)

Twelve samples, of which Nos. 31 and 32 were deficient in strength; Nos. 30, 104 and 117 were of inferior strength and quality; Nos. 111 and 114 were of fair quality, and Nos. 57, 99, 102, 106 and 120 were of good quality. No. 99 was labeled "Nitrous Ether" by mistake. Stronger ether, being largely used as an anæsthetic, ought to be of good quality, but these results show that an article of a quality inferior to that required by the pharmacopœia, is frequently offered for sale. The U. S. P. requires a specific gravity "not higher than 0.725 at 15 deg. C. (59 deg. F.)." The specific gravities of the twelve samples examined were as follows:

No. 30	0.737
No. 31	0.752
No. 32	0.739
No. 57	0.726
No. 99	0.724
No. 102	0.725
No. 104	0.744
No. 106	0.726
No. 111	0.724
No. 114	0.724
No. 117	0.747
No. 120	0.724

Purified Chloroform. (*Chloroformum Purificatum*, U. S. P.)

Twelve samples, of which Nos. 33 and 35 were of inferior quality and strength; No. 113 of fair quality, and Nos. 34, 58, 98, 101, 103, 105, 110, 116 and 119 were of good quality. The U. S. P. requires a specific gravity of 1.485–1.490 at 15 deg. C. (59 deg. F.) The specific gravities of the twelve samples examined were as follows:

No. 33	1.456
No. 34	1.488
No. 35	1.450
No. 58	1.493
No. 98	1.490
No. 101	1.489
No. 103	1.488
No. 105	1.488
No. 110	1.488

No. 113	1.487
No. 116	1.488
No. 119	1.489

Carbonate of Ammonium. (*Ammonii Carbonas*, U. S. P.)

Ten samples; of which Nos. 36, 115 and 118 were of good quality; No. 112 of fair quality, and Nos. 37, 38, 100, 107, 108 and 109 were of inferior quality, having undergone partial decomposition. In order to preserve this important medicinal agent in good condition it should be kept in well-stopped bottles and in a cool place. The results of the analyses made show that it is often carelessly kept and partly decomposed in consequence when offered for sale. The percentage purity of the ten samples was as follows:

No. 36	92.66
No. 37	66.44
No. 38	83.03
No. 100	65.91
No. 107	69.44
No. 108	67.87
No. 109	67.59
No. 112	79.68
No. 115	95.10
No. 118	96 95

Average of the ten samples, 78.46 per cent.

Chlorate of Potassium. (*Potassii Chloras*, U. S. P.)

Five samples, Nos. 39, 40, 41, 60-and 61, all of good quality.

Reduced Iron. (*Ferrum Reductum*, U. S. P.)

Six samples were examined, none of which came up to the pharmacopœial standard, which requires 80 per cent of metallic iron, but with the exception of No. 42 which consisted of *dried sulphate of iron*, sold through ignorance; the remaining samples, Nos. 43, 44, 62, 63 and 64 were considered of fair quality.

Gallic Acid. (*Acidum Gallicum*, U. S. P.)

Four samples, Nos. 45, 46, 47 and 68, all of good quality.

Dried Sulphate of Iron. (*Ferri Sulphas Exsiccatus*, U. S. P.)

One sample, No. 67, which was of good quality.

Water of Ammonia. (*Aqua Ammoniæ*, U. S. P.)

Five samples; Nos. 72 and 73 were of fair, and Nos. 70, 71 and 91 of good quality, though most of them contained slight traces of metallic impurities, sulphates, etc. The U. S. P. requires

"ten per cent by weight of the gas." The percentage in the five samples examined was as follows:

No. 70	10.81
No. 71	15.50
No. 72	8.35
No. 73	7.89
No. 91	11.08

Benzoic Acid. (*Acidum Benzoicum*, U. S. P.)

Three samples, of which Nos. 74 and 95 were of good, and No. 75 of fair quality.

Oxalate of Cerium. (*Cerii Oxalas*, U. S. P.)

Four samples, Nos. 76, 77, 90 and 97, all of a fair degree of purity, though none of them corresponded precisely with the requirements of the U. S. P.

Magnesia. (*Magnesia*, U. S. P.)

Four samples, of which No. 92 was of good quality, Nos. 78, 79 and 80 only fair. This article is generally carelessly kept, and therefore partially carbonated by exposure to the air. It should be kept in well-closed vessels.

Washed Sulphur. (*Sulphur Lotum*, U. S. P.)

Four samples; Nos. 81 and 93 were of good quality, No. 82 consisted of *precipitated sulphur* sold by error, and No. 83 was *sublimed sulphur* or common "flowers of sulphur." The pharmacopœial requirements are plain, and there is no excuse for the sale of an unpurified article or other preparation of sulphur.

Oxide of Zinc. (*Zinci Oxidum*, U. S. P.)

Four samples, Nos. 84, 85, 86 and 94, all of fair quality.

Iodoform. (*Iodoformum*, U. S. P.)

Four samples, Nos. 87, 88, 89 and 96, all of good quality.

II. VINEGAR.

The seventy-four samples examined were all purchased at grocery stores, cider vinegar being called for in each instance. At a meeting of the Board held January 16, 1883, a standard was adopted for cider vinegar under and pursuant to section 4 of chapter 407 of the Laws of 1881, which standard was "not less than five (5) per cent of pure acetic acid" and "not less than one and one-half per cent of solid matters" on evaporation and drying at 212 deg. F. The Massachusetts Law of 1882 required the same percentages in the case of *all* vinegars, but in 1885 was amended and now requires "not less than four and one-half per cent by weight of absolute

acetic acid" in *all* vinegars and "not less than two (2) per cent of cider vinegar solids" in *cider* vinegar, and it prohibits the sale not only of adulterated or weak vinegar, but of any vinegar for cider vinegar which is not made exclusively from apple cider, and likewise the use of any artificial coloring matter. This is a good law, for while vinegar made from spirits or otherwise may be equally wholesome, it ought not to be sold for cider vinegar, as is very frequently the case.

An article so largely used in the preparation of food as vinegar ought to be both free from adulteration and of good strength as well, but the results of the examinations so far made show that here as elsewhere wide differences in quality exist. The addition of mineral acids is very uncommon, but much vinegar is sold which has been plentifully watered, and the greater part of that sold as cider vinegar is a so-called white wine vinegar colored by caramel with perhaps some cider vinegar added to give it flavor.

Of the seventy-four samples of vinegar examined, thirty-five were purchased in Albany, nineteen in Troy, six in West Troy, four in Green Island and ten in Cohoes. Of the total number, eleven or 14.8 per cent, were found to contain five per cent or over of absolute acetic acid, and sixty-three, or 85.2 per cent, contained less than five per cent and therefore fell below the legal requirement; eighteen, or 24.3 per cent, contained 4 1-2 per cent or over, and 56, or 75.7 per cent contained less than 4 1-2 per cent. The highest percentage of absolute acetic acid was 6.2 per cent and the lowest 1.8 per cent, the average being 4 per cent.

Number.	Per cent Acetic Acid.	Number.	Per cent Acetic Acid.
121	4.1	142	2.9
122	6.2	143	4.4
123	4.0	144	4.6
124	4.1	145	4.3
125	4.8	146	3.3
126	3.5	147	3.2
127	3.4	148	4.0
128	5.2	149	3.9
129	4.1	150	5.2
130	3.3	151	4.3
131	5.5	152	5.0
132	4.3	153	4.4
133	3.5	154	4.2
134	3.8	155	3.0
135	2.3	156	3.8
136	4.2	157	2.9
137	4.7	158	5.0
138	4.9	159	4.2
139	5.0	160	4.2
140	3.8	161	5.0
141	3.6	162	4.3

Number.	Per cent Acetic Acid.	Number.	Per cent Acetic Acid.
163	3.6	179	3.4
164	3.6	180	4.3
165	3.9	181	4.5
166	5 4	182	4.1
167	4.2	183	2.7
168	3.7	184	3.5
169	3.9	185	3.8
170	4.3	186	5.5
171	5.0	187	3.4
172	4.9	188	2.8
173	4.4	189	3.2
174	2.4	190	3.3
175	2.5	191	3.5
176	3.5	192	3.6
177	3.7	193	4.5
178	1.8	194	4.4

Other analyses made for the Board have been as follows :

WATER.

Four samples. One of these was from a city well, and furnished so striking an example of drinking water contaminated by excrementitious matter, probably serving as the medium of disease transmission, that the report made at the time is appended.

ALBANY, *September* 10, 1885.

Dr. A. L. CARROLL, *Secretary State Board of Health, Albany, N. Y.:*

DEAR SIR — I have made an analysis of a sample of well water from premises No. 308 Third street, Albany, sent to me September 5, 1885, by Dr. B. U. Steenberg of Albany, by request of Mr. Carman. The results point to gross contamination of the water. A death from diphtheria occurred in this house very recently and three other deaths from the same disease are known to have occurred in the immediate vicinity within a short time. I visited the premises on the 5th inst., with Dr. Steenberg and found the well, said to be thirteen feet deep, dug in a sandy soil and situated directly in the rear of the house. A privy with vault said to be eight feet deep and full to the surface of the ground, was situated about seventy feet from the well. A drain pipe from the second story of the next house on the east discharged within a few feet of the well upon the surface of the ground, the slop water, etc., from the same flowing back upon the lot and soaking into the ground. The condition of things described as existing upon these premises is essentially the same in all others in this neighborhood. There is no drain in the street, as I am informed, west of Thornton street and no water mains laid. Foul privies abound on all sides, and the water supply is drawn

from shallow wells dug in sand, in some cases within a *few feet* of the privies. Much drainage is discharged upon the surface of the ground, and as there are no pavements in this immediate locality it soaks into the sandy soil. Such a condition of things is in the highest degree insanitary, and it is certainly not surprising if diphtheria, typhoid fever and other infectious diseases are of frequent occurrence, as is said to be the case.

Analysis.

Color and appearance	Clear, Colorless.
Odor at 100 degrees F	None.
Chlorine, grains per U. S. gallon	13.42
Free ammonia, parts per million	6.400
Albuminoid ammonia, parts per million	0.340
Total solids, grains per U. S. gallon	88.72
Loss on ignition, grains per U. S. gallon	43 78
Mineral matter, grains per U. S. gallon	44.94

Very respectfully yours,
WILLIS G. TUCKER.

Samples of water from Kingston (city water supply) and from Oneida lake (two analyses) were also analyzed. The former were reported October 9, and the latter November 10, 1885.

KEROSENE.

Six samples have been submitted for examination with the following results:

Flashing point.	Degrees F.
No. 8686	100
No. 8687	100
No. 8688	100
No. 8689	100
No. 8690	99
No. 8691	100

All of which is respectfully submitted.

WILLIS G. TUCKER,
Analyst.

CHEMICAL LABORATORY, ALBANY MEDICAL COLLEGE, ALBANY, N. Y., *February* 22, 1886.

REPORT

OF G. C. CALDWELL, Ph. D.,

ANALYST OF ALKALOIDAL MEDICINAL PREPARATIONS.

Chemical Laboratory, Cornell University,
February 10, 1886.

To the Secretary of the State Board of Health :

Dear Sir — I beg to submit the following report of work thus far accomplished in the examination of alkaloidal medicinal preparations. The work was begun September 1, 1885.

The assay of quinine pills.— No method of assay of this preparation is given in the Pharmacopœia.

The determination of the total quantity of alkaloid in the pills may be made in two ways, both of which depend upon the liberation of the quinia from the acid by a stronger base, the extraction of this alkaloid by ether, the expulsion of the ether from the solution thus obtained, and the drying and weighing of the residue. As this residue may contain other alkaloids besides quinia, the pharmacopœial test of purity must be applied to it before the assay can be regarded as completed.

These two methods of determining the total alkaloid in the pills differ only in respect to the treatment for the liberation of the quinia from the acid, and the mode of extracting the quinia by ether. By one method, described by Allen for the assay of quinine preparations generally, the solution of the substance in acidified water is treated with ammonia, and the precipitated quinia is then taken up by ether. By the other method first described by Parsons, the pills are softened with a small quantity of water, freshly slacked lime is added, the mixture is dried, pulverized, transferred to a continuous extractor and treated with the ether for several hours.

The manipulation of the first method is much easier and more satisfactory; but Mr. Parsons claimed for the second method a greater degree of accuracy; after the mixture of substance and lime is once safely transferred to the extractor, it is probable that the manner of making the ether extract will generally yield a purer solution of alkaloid; for nothing but pure, stronger ether comes in contact with a mass supposed to contain nothing soluble in such ether except alkaloids. In the case of the other method, ether saturated with water is agitated with an aqueous, ammoniacal solution of so much of the pill as is soluble in water, and opportunity is thus afforded for the solution of other matters besides alkaloids; but the range of solvent power of ether saturated with water is probably

but little greater than of pure ether. I am not aware how far the difference between the two has been carefully tested, so far as it bears on the point under discussion. I hope to be able soon to make such tests myself.

The pulverizing of the dried mixture of lime and pill substance must, of course, be very complete, in order that no particles of the quinia shall be mechanically inclosed in the large mass of substance that is entirely insoluble in the ether, and is thus quite capable of protecting such inclosed quinia from solution. I have found this pulverization very tedious; and the transferring of this fine, dry and sometimes rather adhesive powder from a mortar to the extractor is not the kind of an operation that a chemist likes to perform in quantitative work. Other and more serious objections to the method were brought out in my very brief experience with it.

Those who are familiar with the continuous ether extractor are aware that a tolerably rapid percolation of the ether through the mass to be extracted is essential. In the case of the second sample of pills that I attempted to assay by this method, the powdered contents of the extractor were, for some reason, converted on contact with the ether into a hard and perfectly impervious mass, on which the ether stood for twenty-four hours without the passage of a drop through it. Of course the assay was an entire failure. The fourth sample of pills, of which an assay was also attempted by this method, behaved in precisely the same manner. I had taken it from my numbered collection without noticing the name of the maker; it proved to be the same that had given me trouble in the first instance. Such a result, after having carefully executed the most tedious part of the work, is discouraging, to say the least, even if it may not often occur.

The second objection to the method affects its accuracy, and might not have been brought to light if I had not at the same time checked this method by the other. On preparing the solution of another sample of pills (No. 19) for the other method, it appeared that they contained a notable quantity of a fatty substance, which by the dry method would be extracted and weighed as quinia; by the solution method, as I conduct it, this fat is at once detected and removed, with other insoluble matters by filtration, before the liberation of the quinia and its solution in ether. These two-grain pills, assayed by the dry method, gave a result corresponding very closely to the two grains of crystallized sulphate of quinia per pill; but, assayed by the solution method, which, in this case, would unquestionably give a more reliable result, it corresponded to but one and three-quarters grains to the pill.

The degree of accuracy of the solution method was tested by the assay of a solution, containing a known quantity of a reliable brand of sulphate of quinia, together with the usual proportions of other ingredients commonly used in the preparation of the pills, such as glucose, gum-arabic and gelatine; several weighed portions of such a solution were subjected to analysis. It being stated that some glucose may be dissolved by the ether in this operation, and thus a

too high result obtained, the residue of quinia by the first precipitation and extraction was dissolved by dilute sulphuric acid, and the quinia was again precipitated by ammonia, and taken up by ether. The results are given in per cents of the quality of quinia that should have been obtained if the process were perfect.

Assay Number.	Per cent.
1	100.00
2	98.01
3	99.42
4	97.80

Average, 98.8 per cent.

Four samples of pills have thus far been assayed by this method, and also partly by the dry methed. The manner of conducting the solution method is essentially the same as described by me in a former report to this Board,* except that, instead of dissolving a small number of the pills in the graduated tubes in which the assay is made, a filtered solution of a larger number of pills, representing from fifty to seventy-five grains of the sulphate, is prepared, and two or more parts of the solution, carefully weighed, are subjected to the assay.

The results of the examination of these four samples are given in the following table, calculated to grains per hundred pills of sulphate of quinia, with seven molecules of water of crystallization, which, according to Parsons, is all the water that need be allowed. Stronger ether was used in all cases.

No. of Sample.	Put up by	Where purchased.	Sulphate of Quinine, Formed. (Grains per pill.)			
			Dry method.		Solution method	
18	McKesson & Robbins.	Ithaca.....	192	197	194	194
19	Tilden & Co.....	Ithaca.....	206	....	179	172
20	Otis Bros.....	Binghamton	....	....	228	231
22	Keasby & Mattison....,	Binghamton	....	....	92.8	92

The discrepancy in the results by the two methods in the case of sample 19 is explained above; the second result by the solution method is not, in this case, obtained by the assay of a second portion of the solution, but by solution, re-precipitation and re-solution by ether of the product of the first assay; in the other cases the two results represent assays of two separate portions of the same solution. Samples 18, 19 and 20 were two-grain pills; sample 22, one-grain.

The tests of the purity of the alkaloid obtained in these assays yet remain to be made.

Assay of Citrate of Iron and Quinine.

The assay of this preparation was conducted in the same manner as in the case of the pills, except that, as the citrate dissolves more or less readily to a clear liquid, the solution of a weighed quantity

*Second Annual Report of the State Board of Health of New York, p. 697.

was made directly in the assay tube. The Pharmacopœia prescribes for the assay the use of potash as a precipitant of the alkaloid, in the presence of tartaric acid, and chloroform as the solvent of the alkaloid. By the use of ammonia and stronger ether instead of potash and chloroform, the residue of quinine obtained appears to be purer, because less colored, the necessity of using tartaric acid is avoided, and the manipulation is more convenient.

The following tests of the accuracy of the method were made with weighed portions of a solution containing citrate of iron and ammonia and a known quantity of sulphate of quinia; the results are given in per cent of the quantity that should have been obtained if the method were perfect.

Number.	Per cent.	Number.	Per cent.
1	98.64	7	99.15
2	100.02	8	99.01
3	100.04	9	101.30
4	99.07	10	101.10
5	99.05	11	101.10
6	98.93		

In the case of the last three results, the ether was very vigorously shaken up with the aqueous liquid in the tube, while in the other cases the agitation was more gentle, but was continued as long as any undissolved particles of quinia were visible. In my assays of samples of the citrate the method of moderate agitation was followed.

The results above given appear to justify my dependence on the ammonia-ether method of assay as trustworthy.

The U. S. Pharmacopœia of 1880 states that the citrate of iron and quinine should yield a quantity of quinia, when assayed by the method there described, equivalent to twelve per cent of the original citrate.

The results of my duplicated examinations of this preparation are given below.

No. of sample.	Said to be put up by —	Where purchased.	Per cent of quinia found.		
1	McKesson & Robbins	Ithaca	8.93	8.99	
2	Powers & Wightman	Ithaca	9.66	9.70	
3	Charles T. White & Co	Ithaca	9.36	9.06	
4	Rosengarten & Sons	Ithaca	11.54	11.75	
5	C. W. Holmes	Elmira	7.08	7.17	
6	McIntyre & Embury	Elmira	10.48	10.88	
7	Unknown	Elmira	9.16	9.24	
8	McKesson & Robbins	Elmira	10.13	10.07	
9	Fraser & Lea	Ithaca	4.09	4.02	
10	Billings, Clapp & Co	Syracuse	3.36	3.41	
10	(Re-examination)		3.40	3.42	
11	Hall & Rückel	Syracuse	7.75	7.83	
11	(Re-examination)		7.79	7.75	
12	Mellinckrodt Chemical Works	Syracuse	10.72	....	
14	Tarrant & Co	Owego	11.10	11.12	11.07
15	E. R. Squibb	Binghamton	10.63	10.71	
16	Sharp & Dohme	Binghamton	9.14	9.43	
17	Schieffelin & Co	Binghamton	10.48	9.31	
21	Charles Pfizer	Binghamton	5.85	5.87	

Inspection of the table shows that the quality of the citrate is quite variable, and that in some cases it falls so far below the standard that its medicinal effect cannot but be notably affected.

In the last report of the Massachusetts Board of Health, Lunacy and Charity the results of the examination of fifteen samples of citrate of iron and quinine are given, showing a range of from 8.68 to 12 per cent.

As in the case of the pills the quality of the alkaloid in these samples of citrate that I have assayed still remains to be tested.

Respectfully submitted,

G. C. CALDWELL,
Analyst.

REPORT

OF SAMUEL A. LATTIMORE, PH. D.,

PUBLIC ANALYST,

ON

EXAMINATION OF DRIED APPLES.

The investigations on which this report is based were undertaken at the request of the President of the State Board of Health, in view of the vast and rapidly increasing quantities of dried apples and other dried fruits found in the market. It was deemed important that the manufacturing processes employed in preparing an article of food which is coming so rapidly into general use should be critically examined in order to ascertain if it suffers any unnecessary deterioration, or is treated with any foreign substances whose use might be considered prejudicial to health.

Until within a recent period the drying of fruit has been conducted only in the most primitive manner and without the aid of any facilities specially designed for such purposes. The heat of domestic fire indoors, or the warmth of the sun without, or, at most, a small and generally rude building containing a rough furnace sufficed to furnish the supply of dried fruit required for home consumption, with perhaps a slight excess for sale. The tough and leathery character of sun-dried fruits, and the brown and charred appearance of those dried by artificial heat did not recommend them to the taste. Their digestibility and nutritive value were greatly impaired. Under such circumstances the supply met the limited demand.

Gradually a higher degree of skill was applied to this industry, and the primitive methods have been greatly improved or rather entirely supplanted. An important stimulus in this direction was given during the late war under the exigency of the demand for vegetable food for our armies in the field, which sanitary science had long since shown to be so salutary and necessary. Fruits and vegetables in their fresh state were too perishable and bulky to bear transportation. Canned fruits and vegetables, while admirably preserving the natural qualities of the fresh article, retained all the original moisture or water averaging perhaps nine-tenths of the whole weight, often with the addition of still more water, thus increasing the weight of an article already heavy in comparison with the quantity of real nourishment contained in it. The great desideratum of getting clear of this large quantity of water, thereby reducing the bulk and weight to a small fraction of the original, and

at the same time rendering it capable of almost indefinite preservation and consequently of easy and cheap transportation, became for the first time clearly apprehended and led at once to the invention of greatly improved processes, based on an intelligent understanding of the principles involved.

A second stimulus was furnished, at least in many of the States of the Union, by the vast increase of fruit production in recent years. The irregularity of the fruit crop has shown the desirability of possessing some means of utilizing the maximum production which often exceeds the demand of the accessible markets during the limited period within which so perishable a commodity can be preserved. It was plain that some more rapid mode of drying would in a great measure meet this difficulty. These two main causes, conspiring with others of minor importance, have within a few years practically created a new industry, the extent and economic importance of which is even yet scarcely appreciated by the public. The extent to which inventive genius has responded to this demand is abundantly manifest in the multitudes of mechanical appliances which have been devised and patented for this purpose.

This industry presents some peculiar and interesting features involving certain economical as well as sanitary aspects. It deals with a raw material which is very bulky and exceedingly perishable and, therefore, unsuited for profitable transportation. Consequently the process of manufacture can never be profitably conducted at a distance from the place of production. It can never be concentrated in large establishments as are many other industries. The drying-house or *evaporator*, as it is technically called, must be near the orchard. Again, the present processes are of the simplest character and may, therefore, be successfully conducted by unskilled persons at low rates of compensation. An evaporator of convenient capacity is accordingly becoming a very common part of the equipment of the farmer who possesses an orchard even of moderate size, or in some neighborhood where fruit abounds, an establishment is erected of such proportions as to consume many thousands of bushels of apples during the season. This industry is in active operation for a period extending over several months, beginning with the earliest ripening fruit and continuing as long as winter apples can be preserved in sound condition, throughout the greater part of the winter season. A new source of income has in this way been opened and already has taken an important place among the industries of the country, and in no State more pre-eminently than in New York. The production of a new, palatable, and wholesome article of food at a very moderate price has naturally been met by a rapidly increasing demand at home and also in foreign countries, as shown by the large quantities exported.

Appreciating the magnitude of this industry and the fact that a practically new article of food is being placed on the market and consumed in enormous quantities, and that this food passes through a manufacturing process, which though simple and inexpensive, and

but imperfectly understood by the public, may possibly affect its wholesomeness, it was deemed the duty of the Board of Health to investigate as far as possible, the processes commonly employed in the drying or evaporating of apples, and also the nature and quality of the product as to its value as an article of food. It is proper to say that no complaint or plausible ground of suspicion has led to this investigation, but it has been undertaken simply to obtain definite information on a subject of public importance.

It may be well to explain that in the trade the term *evaporated* has assumed a technical signification, and is applied only to fruits dried by some one of the rapid modern processes, and is used in contradistinction to the term *sun-dried*, the meaning of which is self-evident. *An evaporator* is the apparatus used, however large or small.

The process has been studied in both large and small establishments and upon different forms of evaporators. While each of these may claim certain special merits, it is not necessary, for the purposes of this report, to enter into a description of the details of any of these forms of apparatus, or to discuss their several advantages. It will suffice to describe the process in general terms. The apples are pared, cored and sliced by machines, which are operated with great rapidity, either by hand or steam power. The slices, which are about half an inch thick, are placed in shallow trays or drawers, which are transferred to a closed box. In the base a small quantity of sulphur is kept burning. The arrangement is such that a number of these trays may be introduced at the same time, one above the other, and yet be exposed to the fumes of the burning sulphur — sulphurous acid — as it circulates among them, and finally escapes into the chimney. The object and effect of this treatment will be considered in a subsequent paragraph. After being submitted to the sulphuring treatment the slices are transferred to the drying screens. These consist of light rectangular wooden frames supporting the wire cloth woven of iron wire coated with zinc — *galvanized*. The size of the screens depends on the size of the evaporator. The sliced apples are spread on these screens in thin layers, and speedily transferred to the evaporator, which usually is constructed to hold a large number of screens at the same time. The heat is usually obtained from a simple furnace or stove, by the use of wood or coal. In some of the larger establishments steam heat is employed with advantage. It is highly important to keep the temperature within certain limits. If it is too low, the time of evaporation is too long; if too high, the fruit is charred. The temperatures observed in various forms of evaporators was found to vary from 95 deg. F. to 290 deg. F. About four hours suffice with this range of temperature to effect the evaporation of apples. The dried fruit is now removed from the screens, and thrown into large heaps, where it is suffered to remain until it is convenient to pack it in cases or barrels. The common cases are made to hold fifty pounds of evaporated fruit when it is tightly

compressed by powerful machinery. The product is now ready to be sent to market.

It is found in practice that from eight to nine bushels of apples, weighing approximately fifty pounds per bushel, are required to make one case of fifty pounds of evaporated product. In other words, about seven-eighths of the weight of the green fruit are expelled in the process of evaporation, in the form of water, the remaining one-eighth representing the whole of the valuable nutriment of the fruit.

In order to fairly represent the value of evaporated apples as an article of food, the following analyses were made. Fully-ripened fruit was selected and prepared for treatment in the ordinary way. One portion was then evaporated while the other was reserved for analysis in the fresh state. The analysis of the two samples gave the following results, marked No. 1 and No. 2. As representing a low grade, the analysis marked No. 3, of a sample of southern sun-dried apples, is selected:

	No. 1.	No. 2.	No. 3.
Water	87.10	12.37	15.70
Fruit sugar	6.24	43.66	31.31
Malic acid	.35	2.50	2.74
Dextrose and pectin	1.93	13.50	11.10
Nitrogenous substances	.28	1.38	1.12

These analyses are chosen from those made, as fairly representing the extremes found in many samples obtained in the open market, without selection, and coming, doubtless, from different parts of the country. It should be remarked that a wide variation was found in the moisture or water contained in evaporated apples, ranging from ten to twenty per cent of the total weight. It is practically impossible to expel the moisture entirely in the process of evaporation. Just what proportion should be allowed to remain is difficult to define. The present methods of evaporation, on account of the unavoidable fluctuations of temperature, are not capable of producing constant and exact degrees of desiccation. Again, it is quite probable that different varieties of apples would be found to retain their native moisture with different degrees of tenacity.

Possibly it may be undesirable to expel the moisture to a greater extent than is attained in the more carefully-managed establishments, as a higher temperature or a longer treatment, or both, would be required, and in that case the sugar and other valuable constituents would begin to suffer decomposition, and the product would suffer injury. Evaporated apples are highly hygroscopic, and when exposed to damp air absorb a very considerable quantity of moisture. Hence the advantage of packing them solidly in cases, whether for transportation or preservation.

This investigation has revealed only two processes in the manufacture of evaporated apples which may raise a question as to their admissibility on sanitary grounds. One of these is the *sulphuring*

process already described. As is well known the pulp of apple when exposed to the air darkens in color. The rapidity and extent of this change differs in different varieties; it is more marked in fully-ripened apples, and those containing the smallest per cent of acid. The fairer the color of the evaporated product the more it is appreciated by the consumer.

Several means have been employed to prevent this change of color. A very dilute solution of salt is efficacious, but its use is inconvenient and prolongs the drying process, and so far as ascertained is not in use. The almost universal practice is to use sulphurous acid derived from the burning of a small quantity of sulphur. A few moments' exposure of the sliced apples to this gas is sufficient to preserve the natural color during the subsequent evaporation. The question naturally arises, whether the dried fruit retains any of the sulphurous acid? In no case has the writer found any trace of this acid in evaporated apples or other fruit. In the absence of this acid, or any salts formed from it, the question may still arise whether it may not have been converted by oxidation into sulphuric acid, which would remain either in the free state or combined in the form of alkaline sulphates.

In explanation of the failure in every instance to find traces of free sulphuric acid, it may be alleged that in presence of alkaline salts of the organic acids it could not remain in the free state but would naturally enter into combination with the bases of these salts forming the corresponding sulphates. The solution of this question becomes far more difficult from the fact that fruits, in common with most vegetable substances, contain, among their mineral constituents, sulphates. Phosphoric acid is the chief mineral acid found in the apple and is usually present to the extent of 0.2 per cent. The sulphuric acid may be placed at half that quantity, or 0.1 per cent. As it is highly probable that the quantity of sulphates, small as it is, may vary with varying conditions of soil and climate, it would require a large number of analyses to fairly establish the limits of normal variation. Should it appear that the quantity of sulphates found in sulphured apples always exceeds the normal quantity, the excess would very reasonably be credited to the treatment. The comparative analyses of the samples of the same fruit, part of which had been treated with sulphur and part not, showed no wider difference than may be fairly referred to permissible error of experiment. The largest quantities found were so trivial that the writer cannot entertain the opinion that it exceeds the quantity of sulphuric acid normally belonging to that particular sample. It seems entirely reasonable that, during the brief exposure of the sliced apples to the action of the sulphurous acid, the gas is partially absorbed by the moist surfaces, but without penetrating the substance of the pulp, and that, when immediately afterward it is introduced into the evaporator, with a temperature at or often far beyond the boiling point of water, the sudden and rapid evaporation beginning over every part of the surface sweeps away with the cloud of steam every trace of this volatile acid.

The second step in the manufacturing process which has attracted attention on sanitary grounds is the fact that the screens, on which fruits are commonly dried, are made of wire cloth, protected with a coating of zinc (galvanized). The question very naturally arises whether the acid juices of the fruit do not attack this coating of zinc, forming a poisonous salt which may adhere to the fruit in larger or smaller quantity. The application of the most sensitive tests to apples, known to have both been treated with sulphurous acid and subsequently dried on galvanized screens, failed to indicate the slightest traces of the metal zinc. Nevertheless the screens suffer oxidation somewhat rapidly, and must be renewed after a few seasons' wear, and it seemed desirable to ascertain what becomes of this lost metal. A sample of galvanized iron-wire cloth, with meshes one-fourth of an inch in diameter, such as is commonly used, was found to contain thirty-three per cent of its weight of zinc. A second sample of a similar screen, which had been worn out by three seasons' use, was found to contain nine per cent of zinc. We have here a loss of twenty-four per cent of zinc, which, considering the quantity of the wire fabric required in a single evaporator, amounts to a very considerable weight. A careful examination of the screens, however, while in use furnishes an explanation of this disappearance of the zinc from the iron wire.

As the dried fruit is swept from the screen on its removal from the evaporator, it is seen that the saccharine juices of the fruit had been rapidly evaporated in contact with the heated metal gauze, closely investing it as with a varnish. Where the sliced fruit happens to adhere slightly to the screen, its removal usually leaves a film adhering to the screen, instead of stripping away the more adherent coating of the wire. From this cause the meshes of the screens are rapidly closed to such an extent that the free circulation of the hot-air among the screens, which are placed one above the other, is obstructed. To meet this difficulty it becomes necessary at very frequent intervals to remove these accumulations from the screens, which is done by a vigorous scrubbing with water and brooms or stiff brushes. It is in this process, perhaps daily repeated, that so much of the zinc as may have been rendered soluble either by the sulphurous acid or by the acids of the fruit itself, is washed away, until the iron wire begins to be exposed and the screen becomes unfit for further use.

In conclusion, it appears plain that there can exist no well-founded cause of apprehension as to any dangerous contamination of evaporated apples or other fruit from either of those two sources. It is certainly a matter of congratulation that in the manufacture of an article of food already so extensively used and likely to come into still more common use, there exists but slight possibility of any deterioration of the nutritive value of the product by the addition, incidentally or otherwise, of any foreign substance. The process of evaporation is simply the rapid removal of the greater part of the water present in the green fruit, at such a temperature as to pre-

clude any important chemical changes in any of the several constituents. Consequently the addition of the same quantity of water at any subsequent time restores the dried pulp to a condition very closely approximating, both in taste and nutritive value, the fruit in its original state, and differing widely from fruit slowly dried by days of exposure in the open air.

The evaporating process, therefore, renders one of the most perishable of food articles capable of almost indefinite preservation without loss or deterioration. It renders a bulky article exceedingly compact, as evinced by the fact that a single case containing fifty pounds, and occupying less than two cubic feet, represents the entire nutritive value of from six to eight bushels of green apples weighing from three to four hundred pounds. The process of effecting this result is of the simplest and most inexpensive nature. Transportation is thus greatly facilitated, and a new article of the greatest hygienic value is added to the supplies of the army and navy.

It would be interesting to form a trustworthy estimate of the magnitude of this industry, which is almost exclusively confined to the United States. Reliable statistics, however, are unattainable for even a single State. "The Producers' Price Current" of January 2, 1886, reports the number of packages — a term which includes barrels as well as the ordinary fifty-pound packing case — received in New York city alone, during the year 1884, at 175,565, and, for the year 1885, at 143,981. The number of packages exported from New York during the same years is stated to be 98,455 and 76,596. At the last meeting of the New York Horticultural Society reports were read estimating that the production of evaporated apples in the four counties of Niagara, Orleans, Genesee and Wayne for the past season reached 7,425,000 pounds, or 148,000 boxes. It is believed by those who are inclined to consider this estimate too high, that the product of the State of New York for the last season is not less than 8,500,000 pounds. This quantity of evaporated product required nearly a million and a half bushels of green apples.

It may be added that enormous quantities of other fruits are being evaporated in the same manner.

From these considerations it appears that this rising industry is of great importance, not only in its economic aspects in rendering an extremely perishable commodity capable of indefinite preservation, in reducing all that is valuable in a bulky article to a small space, thus rendering it easily transportable, but especially in furnishing a most wholesome and valuable article of food at a price which places it within the reach of the humblest.

S. A. LATTIMORE.

REPORT

ON THE

EXAMINATIONS OF BEERS.

REPORT ON BEER.

To Hon. Erastus Brooks, *Chairman of the Executive Committee:*

Sir.— I have the honor to submit the following report on the work assigned to me by resolution of the Board, passed June 15, 1885, namely: Resolved, That the assistant secretary be authorized to make arrangements for the collection of samples of spirituous, fermented or malt liquors for analysis in accordance with chapter 176 of the Laws of 1885, and that the whole business arrangement for the enforcement of said law be referred to him under the direction of the Executive Committee."

REPORT.

This law requires that "the Board shall at least once in the calendar year cause samples to be procured in public market or otherwise, of the spirituous, fermented or malt liquors distilled, brewed, manufactured or offered for sale in each and every brewery or distillery located in this State, and a test sample or analysis thereof to be made by a chemist or analyst duly appointed by said Board of Health."

The provision being thus specific, the question of the best method of carrying out its intent was the first confronted. Many difficulties incumbered the purchase of these samples, mainly in open market, owing to the very great number of saloons involved. To ascertain the particular brand sold in each would have needed more time and expense than was at command. There was also risk of such collections being imperfect, and the brewers unfairly and incompletely represented.

It seemed more feasible, therefore, to collect the samples directly from the breweries and to supplement them by others purchased in the saloons, thus at once showing the character of the beverages as brewed and as actually retailed to consumers. This course was finally adopted.

By correspondence with the Internal Revenue Department, an official list was obtained of all the brewers and distillers in the State, and these were properly recorded in a register specially prepared for the purpose.

In order that the brewers might be fully apprised of the law, the following notice was mailed to their various addresses:

NOTICE.

The State Board of Health hereby notifies all distillers or brewers of spirituous, fermented or malt liquors in the State of New York, that on April 29, 1885, the Legislature passed a law known as chapter 176, a copy of which is appended to this statement.

This law, in addition to the duties covered by chapter 407 of 1881, concerning which regulations of the Board have already been framed and published, specifically imposes upon the State Board of Health the duty of making at least annually an examination of samples of the "spirituous, fermented or malt liquors distilled, brewed, manufactured or offered for sale in each and every brewery or distillery located in this State."

The State Board of Health at its annual meeting in New York city, on May 14, 1885, adopted measures for the carrying out of the spirit and purpose as well as the letter of the proposed law.

The State Board of Health hereby gives notice that in this as well as in all other matters intrusted to its administration it will endeavor to discharge its duty impartially, without fear or favor, relying upon the co-operation of all good citizens and upright manufacturers for the successful enforcement of the statute.

While in no case will violations of the law be condoned or connived at, yet the investigations will be conducted in a spirit of fairness and with a proper regard for all vested business interests.

Information of the violation of any of the provisions of the statute will at all times be gladly received at the Central Office, where such use of it will be made as in the judgment of the Board will best carry out the intent of the law and best conserve the interests of the public.

ALFRED LUDLOW CARROLL, M. D.,

ALBANY, *June* 20, 1885. *Secretary.*

By resolution of the Board, Dr. Englehardt was elected chemist to analyze the various samples. Having before served the Board acceptably as chemist in the department of wines, beers, spirits and cordials, under the old law, "To prevent the adulteration of food and drugs," his selection was considered the best that could be made.

The limited funds at the Board's disposal for the work, $3,000, made it necessary to secure the lowest possible terms for each analysis as otherwise the number to be made would have exhausted an appropriation many times larger. An arrangement was finally entered into with Dr. Englehardt by which he agreed to make the analysis at minimum rates, and the following form of analysis agreed upon:

Color	Ash, per cent .....
Transparency	Phosphoric acid, per cent
Specific gravity	Water, per cent .....
Alcohol by weight, per cent..	Substitute for hops.....
Extractive matter, per cent...	Substitutes for malt ....
Sugar, per cent	

Remarks:

Analyst.

The law provides that the "samples shall be kept in vessels and in a condition necessary and adequate to obtain a proper test and analysis of the liquors contained therein. The vessels containing such samples shall be properly labeled and numbered by the secretary of said Board of Health, who shall also prepare and keep an accurate and proper list of the names of the distillers, brewers or vendors, and opposite each name shall appear the number which is written or printed upon the label attached to the vessel containing the sample of the liquor manufactured, brewed, distilled or sold. Such lists, numbers and labels shall be exclusively for the information of the said Board of Health, and shall not be disclosed or published unless upon discovery of some deleterious substance prior to the completion of the analysis, except when required in evidence in a court of justice. The samples when listed and numbered shall be delivered to the chemist, analyst, or other officer of said Board of Health, and shall be designated and known to such chemist, analyst or officer only by its number, and by no other mark or designation. The result of the analysis or investigation shall thereupon, and within convenient time, be reported by the officer conducting the same to the secretary of said State Board of Health, setting forth explicitly the nature of any deleterious substance, compound or adulteration which may be detrimental to public health and which has been found upon analysis in such samples, and stating the number of the samples in which said substance was found. Upon such examination or analysis the brewer, distiller or vendor in whose sample of spirituous, fermented or malt liquor such deleterious substances, compounds or adulterations shall be found, shall be deemed to have violated the provisions of this act, and shall be punishable as prescribed in section seven of this act.

To satisfy these conditions bottles and cases were ordered specially marked with the State Board's imprint, and a cool cellar rented convenient to the chemist, where the beers could be kept at proper temperature awaiting analysis. Tags were also prepared (of which the following is a specimen), to be tied on the samples as they were collected:

No. The State Board of Health, Date, .
Sample of .
Purchased of ,
Brewed or distilled by .
Collector's name.

These tags were removed from the sample on its reaching the Central Office, and a label, with a certain number, of which the following is a sample, pasted on:

STATE BOARD OF HEALTH,
Chapter 176, 1885.
Secy's No, .

The samples as sent to the chemist were labeled with the above label and contained no other information than the secretary's number.

Located as the breweries are all over the State, it was necessary to have a special collector, a man of thorough integrity, who could give his whole attention to the work. Fortunately there was available at the time one who had been in the Board's service formerly, and an arrangement was made with him at the moderate rate of $2 a day and expenses, to make the collections for the entire State excepting in the cities of New York and Brooklyn where the breweries are so numerous and so close together, that it was thought hotel and traveling expenses might be saved by employing a person who had his home in one or other of these cities. Collecting was begun in the city of Albany on the 15th day of July, 1885, and continued with slight interruption till November 25, 1885.

An effort was made to take such sanitary observations as might be useful to the Board in making its recommendations, by thoroughly inspecting every brewery. The collections were necessarily retarded somewhat by this course, but the gain was more than compensatory in the information obtained.

The law requiring that each sample be marked by the secretary before forwarding it to the chemist for analysis, added to the expense of expressage, making in fact three expressages, one in shipping the empty case of bottles to the point where the collections were to be made, the second in forwarding them after the samples had been collected to the Central Office to have the tags removed and numbered labels pasted on, and the third, in the transfer of the samples properly marked to the chemist for analysis.

That no one could tamper with these each case was locked. The keys for the cases were made in triplicate, one being held by the collector, the second at the Central Office, and the third being in the possession of the chemist.

The law also requiring that the results of the analyses should be for the exclusive information of the Board, the returns from the analyst were kept under lock and key.

The following is a tabulation of all the analyses received from Dr. Englehardt. They are numbered consecutively, but the names of the brewers are withheld. His own report, which is separately given, will speak for itself. The beers were found to be heavily salted.

Number of sample.	Specific gravity.	Percentage of alcohol by weight.	Percentage of extractive matter.	Percentage of ash.	Percentage of phosphoric acid.	Percentage of water.	Substitutes for hops.	Substitutes for malt.	Remarks.
1 Ale	1021.70	3.748	7.262	0.2737	0.0595	88.990	None found	Apparently glucose...	Ash was white, contained no excess of carbonates, beer perhaps slightly salted.
2 Ale	1020.80	4.955	7.340	0.305	0.066	87.705	None found	Apparently glucose...	Ash white, no excess of carbonates, beer has been salted.
3 Porter...	1007.73	5.429	4 440	0.347	0.0708	90.131	None found	From low per ct. of phosphoric acid we conclude glucose.....	
4 Weiss....	1002.42	1.856	1.408	0.148	0.028	96.736	None	Apparently glucose; phosp'ric acid small amount	The ash was white, there were no carbonates in excess present, but unquestionably salt had been added to beer. This sample of beer must be a kind of Weiss beer, both the alcohol and extract being too low for ale, porter or lager. Taste, sour and insipid. The ash was white (absence of iron), no excess of carbonates present, but salt has been added to the beer.
5 Lager....	1014.96	3.861	5.644	0.2485	0.0915	90.495	None found	Questionable	Ash white, no excess of carbonates, no salt added.
6 Porter...	1011.635	4.043	4.900	0.288	0.052	91.057	None found	Glucose very likely used	Ash white, no excess of carbonates, some salt, perhaps, added.
7 Ale	1012.86	4.833	5.511	0.320	0.092	89.656	None found	None apparently used	Ash white, no excess of carbonates present, salt has been added.
8 Ale	1019.04	3.866	6.716	0.244	0.0642	89.418	None found	Questionable	Ash white, no excess of carbonates, some salt added to the beer.
9 Porter...	1012.429	5.145	5.544	0.278	0.071	89.311	None found	Questionable	Ash white, no excess of carbonates present, beer is salted.
10 Lager....	1022.14	4.127	7.587	0.317	0.117	88.286	None found	Questionable	Ash white, no excess of carbonates nor salt present.
11 Ale	1021.676	5.093	7.743	0.319	0.0904	87.1640	None found	Questionable	Ash white, no carbonates present in excess, apparently some salt added.
12 Lager....	1011.42	3.949	4.770	0.253	0.0833	91.281	None found	None	Ash white, no carbonates in excess, no salt added to the beer.
13 Ale	1018.89	4.144	6.790	0.2/1	0.082	89.066	None found	Glucose apparently...	Ash white, no excess of carbonates present.
14 Ale	1003.26	6.125	3.560	0.346	0.100	90.315	None found	Questionable	Ash white, no excess of carbonates, no salt added to the beer.
15 Ale	1012.44	4.410	5.280	0.410	0.107	90.310	None found	None found	Ash white, no excess of carbonates, no salt added to the beer.
16 Ale	1009.20	7.176	5.560	0 420	0.113	86.844	None found	Glucose ap'ar'tly us'd	Ash white, no excess of carbonates present, beer is not salted.
17 Ale	1005.62	4.476	3.725	0.291	0.101	91.799	None found	Questionable	Ash was white, no excess of carbonates present, salt seems added.
18 Lager...	1016.08	3.795	8.354	0.239	0.0755	90.351	None found	Apparently none us'd	Ash white, no carbonates in excess, nor salt.
19 Lager....	1013.40	5.139	5.497	0.2339	0.080	89.364	None found	Questionable	Ash white, carbonate not excessively present, beer is not salted.
20 Ale	1020.54	4.245	7.439	0.285	0.1064	88.316	None	None	Ash white, carbonates not in excess, sulphates in strong traces, chlorine calculated as salt 0.0137 per cent.
21 Porter..	1012.90	4.202	5.283	0.265	0.09079	90.515	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as common salt, 0.0184 per cent.
22 Porter...	1016.77	4.304	6.274	0.3027	0.1066	89.422	None	None	Ash white, carbonates not in excess, sulphates in strong traces, chlorine calculated as salt, 0.0229.
23 Ale	1022.57	2.393	6.875	0.268	0.0924	90.732	None	None	Ash white no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0228.
24 Ale	1006.72	7.091	4.087	0.347	0.0995	88.822	None	None	Ash white, no excess of carbonates, sulphates in very strong traces, chlorine calculated as salt, 0.0418 per cent.
25 Porter...	1024.11	5.744	7.951	0.266	0.07155	86.305	None	None	Ash white, no excess of carbonates, sulphates in very strong traces, chlorine calculated as salt, 0 0297 per cent.
26 Ale	1022.94	4.309	7.768	0.2827	0.08901	87.923	None	None	Ash of beer was white, containing no excess of carbonates, sulphates of lime in traces, chlorine calculated as salt, 0.01945 per cent.
27 Porter...	1024.52	4.147	8.044	0.371	0.112	87.809	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.0707 per cent.
28 Lager....	1016.21	4.221	6.054	0.2200	0.08539	89.725	None	None	Ash of the beer was white, no excess of carbonates, no sulphates present, chlorine figured as salt, 0.0023 per cent.

BEER ANALYSIS — Continued.

Number of sample.	Specific gravity.	Percentage of alcohol by weight.	Percentage of extractive matter.	Percentage of ash.	Percentage of phosphoric acid.	Percentage of water.	Substitutes for hops.	Substitutes for malt.	Remarks.
29 Ale	1015.30	5.693	6.505	0.253	0.08057	87.802	None	None	Ash white, no excess of carbonates, sulphates very heavy traces, chlorine, when calculated as salt, 0.0183S per cent.
30 Porter .	1016.81	3.298	5.851	0.258	0.0674	88.851	None	None	Ash white, no excess of carbonates, of sulphates very strong traces, chlorine calculated as salt, 0.0267 per cent.
31 Lager...	1014.04	3.6370	5.3120	0.1847	0.08065	91.051	None	None	Ash white, no excess of carbonates, sulphates not present, chlorides calculated as salt, 0.0023.
32 Ale	1015.93	8.994	7.929	0.465	0.1156	83.077	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.08762 per cent.
33 Lager ...	1012.37	4.689	5.368	0.247	0.06830	89.943	None	None ?.....	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0208.
34 Weiss...	1007.83	2.400	2.865	0.2517	0.0335	94.735	None	None ?.....	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.1350 constituting over one-half of the ash. Must be a Weiss beer.
35 Ale	1014.04	7.444	6.929	0.307	0.07907	85.627	None	Yes	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.06237.
36 Ale	1013.33	4.079	5.341	0.238	0.0748	90.580	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.0300.
37 Porter ..	1020.42	3.333	6.779	0.3774	0.07957	89.888	None	Questionable?.....	Ash white, no excess of carbonates, sulphates in very strong traces, chlorine calculated as salt, 0.07957.
38 Ale	1018.67	3.868	6.571	0.2702	0.0792	89.561	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.03903 per cent.
39 Ale	1006.53	5.092	4.045	0.271	0.08503	90.863	None	None	Ash white, no excess of carbonates, sulphates in very strong traces, chlorine calculated as salt, 0.0185 per cent.
40 Ale	1013 34	4.653	5.588	0.231	0.06714	89.759	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.07167.
41 Ale	1002.38	5.739	3.199	0.3173	0.08388	91.062	None	None	Ash white, carbonates not in excess, sulphates in strong traces, chlorine calculated as salt, 0.01187.
42 Lager....	1014.32	3.839	5.478	0.2384	0.08915	90.683	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.02097.
43 Lager....	1015.83	3.504	5.696	0.270	0.08407	90.800	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.00345.
44 Porter ..	1008.92	6.625	5.282	0.3830	0.1487	88.093	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.02085 per cent.
45 Ale	1016.35	4.546	6.267	0.3161	0.1017	89.187	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.0157.
46 Ale	1006.82	6.643	4.751	0.322	0.1012	88.615	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.0395.
47 Ale	1008.48	6.5308	5.124	0.3816	0.1562	88.3452	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.03247.
48 Porter ..	1013.15	4.316	5.400	0.370	0.09094	90.284	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.09091 per cent.
49 Ale	1005.04	4.452	3.336	0.286	0.08747	92.212	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0680.
50 Lager....	1023.68	3.618	7.665	0.259	0.07907	88.717	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0183.

51 Ale	1012.74	3.938	5.125	0.346	0.0661	90.937	None	Apparently	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.08579.
52 Lager	1021.71	5.109	7.830	0.347	0.104	87.061	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0227 per cent.
53 Lager	1011.97	3.866	4.907	0.361	0.08451	91.227	None	Questionable	Ash white, no excess of carbonates, sulphates giving heavy precipitates, chlorine calculated as salt, 0.0300.
54 Lager	1015.64	3.584	5.688	0.276	0.0907	90.728	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, equal to 0.01617 per cent.
55 Lager	1009.88	3.979	4.397	0.217	0.08452	91.624	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.00928 per cent.
56 Lager	1009.03	3.967	4.157	0.281	0.08127	91.876	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.0185.
57 Lager	1012.42	4.845	5.443	0.306	0.1089	89.712	None	None	Ash white, no excess of carbonates, sulphates none, chlorides figured as salt, 0.0023 per cent.
58 Lager	1009.95	4.376	4.607	0.284	0.09001	91.017	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.0162 per cent.
59 Lager	1012.26	3.423	4.803	0.272	0.08714	91.774	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.0346 per cent.
60 Ale	1011.88	5.798	5.698	0.341	0.10188	88.504	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.0115 per cent.
61 Ale	1009.63	7.537	5.699	0.294	0.08048	86.764	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.00923 per cent.
62 Lager	1019.44	4.798	7.207	0.328	0.05675	87.995	None	Yes	Ash white, no excess of carbonates, sulphates very heavy traces, the chlorine calculated as salt, equal to 0.0823 per cent.
63 Lager	1020.40	4.302	7.285	0.318	0.07193	88.413	None	None?	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.05727 per cent.
64 Lager	1009.10	4.601	4.464	0.2747	0.10129	90.935	None	None?	Ash white, no excess of carbonates, sulphates in very strong traces, chlorine calculated as salt, 0.026 per cent.
65 Ale	1020.38	4.465	7.248	0.235	0.0744	88.287	None	Doubtful, am inclined to think substitutes have been used	Ash white, carbonates none in excess, sulphates very heavy indeed, chlorine calculated as salt, 0.059 per cent.
66 Ale	1006.36	5.460	4.140	0.318	0.1162	90.400	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0511 per cent.
67 Lager	1019.30	2.937	6.280	0.216	0.06548	90.7822	None	None	Ash white, no excess of carbonates, sulphates very heavy traces, chlorine calculated as salt, 0.0115 per cent.
68 Lager	1011.94	4.490	5.409	0.230	0.0700	90.101	None	None	Ash white, no excess of carbonates, sulphates in very heavy traces, chlorine calculated as salt, 0.01380.
69 Ale	1020.60	3.507	6.900	0.280	0.0869	89.593	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.057.
70 Ale	1017.04	4.370	6.352	0.287	0.0787	89.278	None	None	Ash white, no excess of carbonates, sulphates in very strong traces, chlorine calculated as salt, 0.046
71 Ale	1020.02	4.160	6.789	0.361	0.0949	89.021	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0759.
72 Porter	1018.05	4.548	6.716	0.437	0.09516	88.736	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.08767.
73 Ale	1020.17	5.185	6.985	0.345	0.1144	87.830	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.039.
74 Weiss	1003.96	2.1122	1.9295	0.1390	0.03763	95.9583	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0465 per cent.
75 Weiss	1007.13	2.572	3.045	0.229	0.0632	94.383	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0394.
76 Weiss	1009.92	2.766	3.842	0.468	0.0398	93.392	None	None	Ash white, no excess of carbonates, sulphates faint traces, chlorine calculated as salt, 0.338 !!!
77 Weiss	1005.50	1.600	2.205	0.176	0.0304	96.195	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0862 per cent.
78 Ale	1004.19	5.792	3.696	0.319	0.1033	90.512	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0093 per cent.

BEER ANALYSIS — Continued.

Number sample.	Specific gravity.	Percentage of alcohol by weight.	Percentage of extractive matter	Percentage of ash.	Percentage of phosphoric acid.	Percentage of water.	Substitutes for hops.	Substitutes for malt.	Remarks.
79 Porter.	1017.30	5.224	6.840	0.217	0.0825	87.936	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0023.
80 Ale	1020.72	4.622	7.399	0.270	0.0965	87.979	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0275 per cent.
81 Porter	1018.50	4.797	6.669	0.254	*0.1114	88.504	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.022.
82 Lager	1017.09	3.879	6.124	0.246	†0.108	89.997	None	None	Ash white, no excess of carbonates, sulphates, faint trace, chlorine calculated as salt, 0.0069. A very fine sample of beer.
83 Lager	1017.21	4.063	6.275	0.236	0.103	89.662	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.00115 per cent. Good beer.
84 Ale	1015.93	4.997	6 170	0.262	0.06729	88.833	None	Questionable ?	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.023 per cent.
85 Lager	1015.43	4.515	5.993	0.3065	0.08353	89.492	None	None	Ash white, no excess of carbonates, sulphates very strong, chlorine calculated as salt, 0.0344 per cent.
86 Ale	1019.27	3.922	6.769	0.245	0.0881	89.309	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0275 per cent.
87 Lager	1013.57	3.844	5.285	0.286	0.0862	90.871	None	None	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.0277 per cent.
88 Ale	1012.22	4,730	5.194	0.235	0.09335	90.079	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0092, sulphates in traces.
89 Porter.	1014.14	4.139	5.573	0.279	0.08169	90.288	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0438 per cent. Beer had a sour taste.
90 Ale	1015.03	4.964	6.115	0.215	0.06503	88.921	None	None	Ash white, no excess of carbonates, sulphate in strong traces, chlorine calculated as salt, 0.0115 per cent.
91 Porter	1021.32	4.150	7.371	0.274	0.0694	88.478	None	Qust'nable, phosp'ric acid too low.	Ash white, no excess of carbonates, strong traces of sulphates, chlorine calculated as salt, 0.0160.
92 Ale	1012.74	2.434	4.401	0.305	†0.1165	93.165	None	None	Ash white, carbonates not in excess, sulphates very strong traces, chlorine calculated as salt, 0.0553.
93 Porter	1013.53	3.562	5.164	0.284	0.0954	91.274	None	None	Ash white, no excess of carbonates, strong traces of sulphates, chlorine calculated as salt, 0.023 per cent.
94 Lager	1021.07	3.260	6.913	0.267	0.1023	89.827	None	None	Ash white, no carbonates, no sulphates, chlorine in traces. Good sample of beer.
95 Weiss	1005.61	0.790	1.836	0.195	0.0424	97.374	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine very heavy, calculated as salt, 0.1049 per cent! Very heavily salted.
96 Lager	1018.47	3.752	6.227	0.277	0,08054	90.021	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine, calculated as salt, 0.0183 per cent.
97 Lager	1018.24	3.195	6.162	0.254	0.08815	90.643	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0044 per cent.
98 Weiss	1005.86	0.913	1.966	0.142	0.277	97.121	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0627 per cent. A kind of Weiss beer.
99 Weiss	1005.04	1.424	1.973	0.1237	0.0353	96.603	None	None ?	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0582 per cent. A kind of Weiss beer.
100 Weiss	1008.06	1.935	2.529	0.240	0.0355	96.534	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine heavy, equal to 0.141 per cent of salt. Kind of Weiss beer, sour taste.

101 Lager...	1023.36	2.373	7.064	0.222	0.08028	90.363	None	None	Ash white, no excess of carbonates, sulphates and chlorine in traces. Good sample of beer in appearance and taste, except slightly pitchy.
102 Lager...	1012.64	4.181	5.183	0.245	0.0855	90.636	None	None	Ash white, no excess of carbonates, no sulphates, chlorine in traces, taste somewhat pitchy.
103 Lager...	1022.92	3.681	7.308	0.227	0.0805	89.011	None	None	Ash white, no carbonates, no sulphates, chlorine trace, beer has a taste of pitch.
104 Lager...	1012.28	3.780	4.934	0.241	0.0966	91.286	None	None	Ash white, no excess of carbonates, no sulphates present, chlorine calculated as salt, 0.0016 per cent.
105 Lager...	1013.34	3.796	5.024	0.174	0.06935	91.180	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0023 per cent, tastes after pitch.
106 Lager...	1019.48	2.873	6.301	0.202	0.08409	90.826	None	None ?.....	Ash white, no excess of carbonates, sulphates none, chlorine calculated as salt, 0.0023 per cent.
107 Ale	1019.71	4.239	7.014	0.367	0.07620	88.747	None	Apparently.....	Ash white, no excess of carbonates, sulphates very heavy, chlorine calculated as salt, 0.1263 per cent! very heavy salted beer.
108 Porter .	1017.07	3.857	6.157	0.222	0.0831	89.986	None	None	Ash white, carbonates not in excess, sulphates in very heavy traces, chlorine calculated as salt, 0.06901 per cent.
109 Ale	1026.50	3.7409	8.379	0.304	0.0802	87.8801	None	None	Ash white, no excess of carbonates, sulphates very heavy, chlorine calculated as salt, 0.0456.
110 Porter .	1025.98	4.318	8.506	0.2914	0.08875	87.176	None	None	Ash white, no excess of carbonates, sulphates in very heavy traces, chlorine calculated as salt, 0.03418 per cent.
111 Ale	1025.10	4.333	8.294	0.321	0.1047	87.373	None	None	Ash white, no excess of carbonates, strong traces of sulphates, chlorine calculated as salt, 0.0571 per cent.
112 Porter .	1007.02	5.123	4.373	0.349	0.1173	90.504	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0441 per cent.
113 Weiss...	1007.17	3.179	3.315	0.164	0.04916	93.506	None	None	Ash white, no excess of carbonates, sulphates absent, chlorine calculated as salt, 0.0023. Of this Weiss beer both bottles contained less than one quart, the beer seemed to have been very scarce indeed. Very slightly sour.
114 Weiss...	1005.77	2.281	2.543	0.104	0.06117	95.176 !	None	None	Ash white, no excess of carbonates, no sulphates, no chlorine. A poor sample of Weiss beer to say the best. Slightly sour.
115 Porter .	1012.93	4.379	5.377	0.272	0.09568	90.244	None	None	Ash white, no excess of carbonates, sulphates in very slight traces, chlorine calculated as salt, 0.045, beer was sour.
116 Ale	1014.80	2.848	5.166	0.309	0.1206 !	91.986	None	None ?.....	Ash white, carbonates not in excess, sulphates in strong traces, chlorine calculated as salt, 0.0336 per cent. Remarkably high percentage of phosphoric acid.
117 Lager...	1021.06	3.617	7.087	0.237	0.08559	89.296	None	None	Ash white, no excess of carbonate, sulphates in traces, chlorine calculated as salt, 0.0023 per cent.
118 Ale	1023.90	3.925	7.821	0.350	0.1114	88.251	None	None	Ash white, no excess of carbonates, sulphates very strong, chlorine calculated as salt, 0.0571 per cent.
119 Porter ..	1021.10	3.723	7.133	0.300	0.07117	89.144	None	None	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.0481.
120 Ale	1018.36	5.500	7.225	0.293	0.08567	87.275	None	None	Ash white, no excess of carbonates, sulphates in slight traces, chlorine calculated as salt, 0.0503 per cent.
121 Porter ..	1028.27	1.671	7.834	0.432	0.0876	90.495	None	None	Ash white, no excess of carbonates, no sulphates present, chlorine calculated as salt, 0.1095 ! heavily salted.
122 Lager...	1019.80	4.010	6.938	0.196	0.09019	89.052	None	None ?.....	Ash white, no excess of carbonates, sulphates in slight traces, chlorine calculated as salt, 0.0023.
123 Ale	1015.89	4.991	6.318	0.349	0.0902	88.661	None	None	Ash white, no excess of carbonic acid, sulphates in strong traces, chlorine calculated as salt, 0.0831 per cent.
124 Porter .	1017.01	4.534	6.429	0.274	0.0886	89.037	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.046 per cent.
125 Ale	1005.45	6.175	4.140	0.331	0.1174	89.684	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0023 per cent, fine sample of beer, very slightly sour.
126 Porter .	1016.13	2.639	5.391	0.309	0.1113	91.970	None	None	Ash white, no excess of carbonates sulphates in traces, chlorine calculated as salt, 0.0092 per cent.
127 Lager...	1015.71	4.114	5.951	0.212	0.08817	89.035	None	None	Ash white, no excess of carbonates, no sulphates, chlorine a mere trace. A good beer.

* High for ash. † High. ‡ Very high.

BEER ANALYSIS — Continued.

Number of sample.	Specific gravity.	Percentage of alcohol by weight.	Percentage of extractive matter.	Percentage of ash.	Percentage of phosphoric acid.	Percentage of water.	Substitutes for hops.	Substitutes for malt.	Remarks.
128 Weiss...	1003.66	1.202	1.534	0.114	0.03055	97.264	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0093 per cent. A poor kind of Weiss beer.
129 Ale	1007.11	5.003	4.101	0.257	0.0666	89.896	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.0511. Beer slightly sour.
130 Ale	1001.369	5.440	2.805	0.4072	0.0947	89.755	None	Questionable	Ash white, no excess of carbonates, sulphates in traces, salt calculated from chlorine found, 0.0854. Beer is salted.
131 Ale	1009.77	3.444	4.092	0.226	0.0542	92.464	None	Apparently.....	Ash white, no excess of carbonates, sulphates strong traces, chlorine as salt calculated, 0.1831, hence the beer is salted.
132 Lager...	1015.09	0.677	4.152	0.388	0.0584	95,171	None	Yes	Ash white, no excess of carbonates, sulphates strong traces, chlorine as salt calculated, 0.0323. Beer is sour.
133 Lager...	1011.20	3.436	4.472	0.313	0.0919	92.092	None	None?.....	Ash white, no excess of carbonates, no sulphates, chlorine as salt calculated, 0.0115.
134 Lager...	1009.18	3.958	4.175	0.2828	0.0619	91.867	None	Apparently.....	Ash white, no excess of carbonates, sulphates in traces, chlorine as salt calculated, 0.0673.
135 Ale	1005 83	6.497	4.462	0.280	0.0815	89.041	None	None	Ash white, no excess of carbonates, sulphates present in traces, chlorine as salt calculated, 0.0116 per cent.
136 Ale	1007.26	5.627	4.315	0.307	0.0947	90.058	None	None	Ash white, no excess of carbonates, sulphates present in traces, chlorine calculated as salt, 0.0186.
137 Porter..	1006.52	5.760	4.282	0.283	0.1067	89.958	None	None	Ash white, no excess of carbonates or sulphates, chlorine calculated as salt, 0.0233. Beer is somewhat sour.
138 Lager...	1011.46	4.4904	5.0146	0.328	0.0557	90.495	None	Yes.....	Ash white, no excess of carbonates, chlorides heavy, hence the beer is salted, sulphates strong traces.
139 Ale	1002.42	5.924	3.125	0.355	0.107	90.951	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.108, hence the beer is salted ; taste sour.
140 Ale	1010.42	3.558	4.323	0.247	0.0439	92.119	None	Yes.....	Ash is white, no excess of carbonates, sulphates strong traces, chlorides heavy, hence the beer must be salted. Beer is slightly sour.
141 Ale	1010.838	3.866	4.602	0.208	0.085	91.532	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0974, beer is therefore salted.
142 Ale	1006.49	4.309	3.652	0.324	0.1016	92.039	None	None	Ash white, no carbonates in excess present, beer has a good taste, not tested as yet for chlorides and sulphates.
143 Porter.	1013.62	5.792	6 122	0.4916	0.0988	88.086	None	Doubtful	Ash white, no excess of carbonates, chlorine, though not determined, very heavy, hence the beer is salted ; ash is very high, sulphates heavy, has a slightly sour taste.
144 Ale	1013.77	3.8720	5.2748	0.306	0.06068	90.8532	None	Yes.....	Ash white, carbonates not in excess, taste not very good, chlorine calculated as salt, 0.113, hence the beer is salted.
145 Porter.	1011.25	3.838	4.672	0.234	0.080	91.490	None	None	Ash white, no excess of carbonates, the beer is slightly sour, chlorine calculated as salt, 0.013, probably some salt added.
146 Lager...	1008.42	4.334	4.143	0.292	0.0971	91.523	None	None	Ash white, no excess of carbonates, chlorides calculated as salt, 0.0046.
147 Ale	1004.73	6.770	4.190	0.284	0.0971	89.040	None	None	Ash white, no excess of carbonates, beer is slightly acid, chlorine as salt calculated, 0.0023, hence not salted.
148 Ale	1004.90	1.967	2.938	0.231	0 0714	95.095	None	None	Ash white, carbonates not in excess, chlorine as salt calculated, 0.0046. Too sour to drink.
149 Porter.	1013.52	4.125	5.405	0.302	0.0671	90.470	None	None, apparently.....	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0786. Beer has a sour taste.
150 Ale	1017.90	4.176	6.549	0.329	0.0733	89.275	None	Apparently.....	Ash white, no excess of carbonates, sulphates and salt in traces.

151	Ale	1008.98	5.836	5.087	0.378	0.0733	89.077	None	Yes	Ash white, no excess of carbonates, but sulphates heavy, salt has been added.
152	Lager	1019.54	3.609	6.702	0.273	0.0991	89.689	None	None	Ash white, no excess of carbonates, salt must have been added, sulphates heavy.
153	Ale	1012.94	2.419	4.441	0.308	0.0905	93.140	None	Doubtful	Ash white, no excess of carbonates found, salt has been added to the beer, sulphates heavy.
154	Ale	1002.52	5.681	3.198	0.366	0.109	91.121	None	None	Ash white, no excess of carbonates found, beer appears salted, sulphates traces.
155	Weiss	1008.55	1.414	2.867	0.069	0.038	95.719	None	Apparently none.	Ash white, no carbonates present in excess, no salt added, must be a kind of Weiss beer.
156	Ale	1010.32	6.002	5.437	0.357	0.0714	88.561	None	Either grape sugar or glucose	Ash white, no excess of carbonates, appears to have received an addition of salt.
157	Lager	1014.56	3.632	5.430	0.230	0.0714	90.938	None	None	Ash white, carbonates not in excess, not salted.
158	Ale	1011.90	3.834	4.812	0.285	0.0771	91.354	None	None apparently	Ash white, no carbonates to excess, beer has been salted, beer somewhat sour.
159	Ale	1016.03	3.140	5.595	0.281	0.0666	91.265	None	Used to some extent	Ash white, carbonates not in excess, salt added.
160	Ale	1010.13	8.333	6.738	0.285	0.0771	84.929	None	Undoubtedly used	Ash white, no excess of carbonates, beer is salted. A very heavy and old ale.
161	Porter	1006.32	5.608	4.213	0.307	0.0976	90.179	None	None	Ash white, carbonates not in excess, no salt added.
162	Ale	1011.20	3.861	4.685	0.252	0.098	91.454	None	None	Ash white, carbonates not excessive, beer salted.
163	Malt wine	1010.53	1.758	4.918	0.298	0.0895	90.321	None	None	Ash white, no carbonates, beer is salted.
164	Ale	1003.08	6.476	4.981	0.424	0.117	88.541	None	None	Ash white, carbonates not excessive, apparently salted.
165	Porter	1015 39	5.289	6.348	0.507	0.171	88.363	None	None	Ash white, carbonates not excessive, salted apparently.
166	Ale	1020.58	3.873	7.081	0.362	0.0838	89.016	None	Apparently	Ash white, carbonates not to excess, beer is salted.
167	Ale	1021.41	5.249	7.862	0.329	0.096	86.889	None	None	Ash white, carbonates not excessive, free of salt.
168	Ale	1013.68	1.796	5.722	0.282	0.0719	90.482	None	Questionable	Ash white, carbonates not excessive, beer is apparently salted.
169	Ale	1001.42	7.491	3.620	0.352	0.100	88.886	None	None	Ash white, carbonates not excessive, salt is not apparently added; a very old beer.
170	Lager	1018.17	1.415	6.672	0.276	0.0838	88.913	None	None	Ash white, carbonates not excessive, no salt added.
171	Ale	1018.68	3.882	6.563	0.308	0.0405	89.555	None	Used	Ash white, no excess of carbonates, beer salted apparently.
172	Ale	1007.44	6.351	4.754	0.345	0.0623	88.895	None	Used	Ash white, carbonates not excessive, beer is salted.
173	Lager	1018.35	3.784	4.682	0.295	0.091	91.534	None	None	Ash white, neither carbonates nor salt present.
174	Lager	1018.60	3.065	6.131	0.237	0.088	90.804	None	None	Ash white, no salt used.
175	Lager	1013.22	2.682	4.663	0.263	0.050	92.655	None	Apparently	Ash white, carbonates not excessive, salted.
176	Ale	1001.90	6.710	3.421	0.339	0.112	89.867	None	None	Ash white, carbonates not excessive, salted.
177	Ale	1012.19	3.252	4.694	0.254	0 056	92.054	None	Some used apparently	Ash white, no carbonates, but salt used.
178	Ale	1013.44	1.183	5.146	0.298	0.0738	90.371	None	None apparently	Ash white, carbonates not excessive, salt seems to have been used.
179	Lager	1022 37	3.303	7.238	0.221	0.069	89.459	None	None	Ash white, no excess of carbonates, some salt used.
180	Lager	1013.58	3.998	5.371	0.243	0.08275	90.631	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.00693 per cent, sulphates in traces.
181	Ale	1018.33	5.786	7.3209	0.4053	0.1027	86.8931	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.1218! heavy salted, sulphates in heavy traces.
182	Porter	1008.45	5.651	4.757	0.5354	0.1420	89.592	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.1171! heavy salted, sulphates in strong traces, beer had a sour and musty taste, unfit to drink.
183	Ale	1007.67	5.734	4.592	0.3373	0.0960	89.674	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.06268 per cent, sulphates in strong traces.
184	Lager	1018.64	4.129	6.673	0.308	0.1000	89.198	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0023 per cent, sulphates in slight traces.
185	Lager	1019.86	3.569	6.734	0.262	0.0989	89.697	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0023, sulphates none.
186	Lager	1015.48	3.130	6.245	0.231	0.942	90.625	None	None	Ash white, carbonates not in excess, chlorine calculated as salt, 0.0023, sulphates none.
187	Ale	1016.32	4.436	6.226	0.3659	0.1010	89.338	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0669, beer is salted, sulphates in traces.
188	Lager	1012.05	4.342	5.141	0.3059	0.08714	90.517	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0231 per cent, sulphates in traces.

BEER ANALYSIS — Continued.

Number of sample.	Specific gravity.	Percentage of alcohol by weight.	Percentage of extractive matter.	Percentage of ash.	Percentage of phosphoric acid.	Percentage of water.	Substitutes for hops.	Substitutes for malt.	Remarks.
189 Ale	1015.19	4.414	5.753	0.4035	0.1042	89.833	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.06017 per cent. sulphates in traces.
190 Ale	1010.97	4.993	5.118	0.363	0.08398	89.889	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0881, beer is salted.
191 Porter	1016.98	4.973	6.644	0.557 !	0.12767	88.383	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0992, heavily salted, sulphates strong traces, beer has a sour taste.
192 Ale	1007.93	4.842	4.255	0.311	0.0644	90.903	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0743, sulphates in traces.
193 Ale	1009.19	3.588	4.027	0.367	0.06202	92.385	None	Yes	Ash white, no excess of carbonates, chlorine calculated as salt, 0.079 per cent, sulphates in strong traces.
194 Lager	1013.14	2.205	4.884	0.243	0.0693	92.911	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0208, sulphates in traces.
195 Ale	1010.77	4.379	4.765	0.3224	0.0999	90.856	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0440, sulphates in traces.
196 Lager	1010.94	4.902	5.101	0.2398	0.0967	89.997	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0023, sulphates very faint traces.
197 Lager	1014.00	3.735	5.370	0.2247	0.0649	90.895	None	None?	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0023, sulphates in strong traces.
198 Lager	1014.85	1.392	4.470	0.2864	0.0993	91.138	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0184, sulphates in strong traces.
199 Lager	1012.73	6.614	6.226	0.2938	0.1052	87.160	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0023, per cent, sulphates none, a good sample of beer.
200 Lager	1017.50	3.842	6.311	0.2045	0.0777	89.847	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0069, sulphates in traces present.
201 Lager	1013.08	4.120	5.305	0.297	0.10426	90.575	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0023, per cent, sulphates a very faint trace.
202 Lager	1027.44	2.635	8.144	0.193	0.0824	89.221	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0068, sulphates in traces, a good sample of beer.
203 Lager	1019.06	3.370	6.432	0.2657	0.0966	90.198	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0023, sulphates absent, a good sample of beer.
204 Lager	1017.88	3.799	6.334	0.2808	0.1113	89.667	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0230, sulphates in traces, a sample of good beer.
205 Lager	1005.73	3.515	3.098	0.376	0.118	93.384	None	None	Ash white, no excess of carbonates or sulphates, but some chlorides.
206 Ale	1017.02	3.724	6.073	0.234	0.0581	90.203	None	To some extent	Ash white, carbonates not in excess, but sulphates and chlorides very strong traces indeed.
207 Porter	1033.63	3 734	11.783	0.386	0.0697 !	84.483	None	Yes	Ash white, no excess of carbonates, sulphates strong, chlorides very strong.
208 Ale	1010.04	3.564	4.120	0.294	0.0424 !	92.316	None	Yes	Ash white, carbonates none, sulphates strong traces, chlorides strong traces.
209 Ale	1024.76	3.725	7.923	0.327	0.0733	88.352	None	Yes	Ash white, no excess of carbonates, sulphates very strong traces, beer appears to be salted.
210 Ale	1005.12	5.894	3.960	0,2925	0.0617	90.146	None	Yes	Ash white, no excess of carbonates, sulphates strong traces, beer is salted and rather sour.
211 Ale	1024.63	3.617	7.854	0.332	0.0754	88.529	None	Some used apparently	Ash white, no excess of carbonates, sulphates very strong traces, chlorides heavy, beer is salted.

212	Ale	1020.54	3.892	7.056	0.298	0.0654	89.0520	None	None	Ash white, no carbonates, sulphates traces, chlorine as salt calculated, 0.135 per cent, beer heavily salted.
213	Lager	1014.33	4.050	5.563	0.244	0.0775	90.387	None	None	Ash white, carbonates not in excess, sulphates very faint traces, chlorides calculated as salt, 0.00925, very fine beer.
214	Lager	1014.07	4.114	5.529	0.225	0.0658	90.357	None	None apparently	Ash white, no excess of carbonates, sulphates slight traces, salt calculated from chlorine found 0.03 per cent, a very fine sample of beer.
215	Ale	1017.41	3.632	6.145	0.303	0.0845	90.223	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine as salt calculated, 0.0784, beer is slightly salted.
216	Porter	1010.65	5.406	5.239	0.391	0.1223	89.355	None	None	Ash white, no excess of carbonates, sulphates slight traces, chlorine as salt calculated, 0.0255.
217	Ale	1007.39	5.017	4.187	0.386	0.109	90.796	None	None	Ash white, no excess of carbonates, sulphates traces, chlorine as salt calculated, 0.1093, beer is salted, taste somewhat sour.
218	Ale	1009.91	3.784	4.284	0.278	0.0538	91.932	None	Yes	Ash white, carbonates not in excess, sulphates very strong traces, beer is salted. The beer was in my opinion unfit to drink.
219	Lager	1015.11	3.351	5.454	0.261	0.0765	91.195	None	None	Ash white, no excess of carbonates, sulphates very heavy traces, beer is salted.
220	Ale	1027.05	3.059	8.153	0.321	0.0477	88.788	None	To a great extent	Ash white, no excess of carbonates, sulphates in strong traces, chlorides heavy.
221	Ale	1005.75	5.557	3.990	0.400	0.1195	88.453	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine as salt calculated, 0.0221, beer is slightly sour.
222	Ale	1015.27	4.868	5.885	0.302	0.099	89.247	None	None	Ash white, no excess of carbonates, sulphates strong traces, chlorine as salt calculated, 0.0414.
223	Porter	1010.85	5.962	5.509	0.311	0.138	88.529	None	None	Ash white, no excess of carbonates, sulphates present in strong traces, chlorine calculated as salt, 0.0603. Beer too sour for my taste. This beer has a remarkable amount of phosphoric acid as compared to the ash, it seems almost as if the phosphoric acid has been added. Will be examined again carefully in this regard.
224	Porter	1023.45	4.313	7.869	0.359	0.0833	87.818	None	Used to some extent, apparently	Ash white, carbonates not in excess, sulphates present in very strong traces, chlorine calculated as salt 0. 0662, beer has a sour taste.
225	Ale	1033.75	2.469	9.501	0.4229	0.0687	88.030	None	Yes	Ash white, no excess of carbonates, very strong traces of sulphates, chlorine as salt calculated, 0.0749. A young beer.
226	Ale	1033.54	2.427	9.456	0.328	0.0729	88.117	None	None	Ash white, no carbonates in excess, sulphates in very strong traces, chlorine as salt calculated, 0.1180, beer is salted. A very young beer.
227	Ale	1012.63	3.312	4.811	0.226	0.0541	91.877	None	To some extent	Ash white, carbonates not in excess, sulphates present in strong traces, chlorine calculated as salt, 0.01157, a fair sample
228	Lager	1014.27	3.241	5.192	0.249	0.0822	91.567	None	None	Ash white, no carbonates in excess, sulphates strong traces, chlorine calculated as salt. 0.0161. Beer was slightly sour.
229	Lager	1012.89	3.707	5.061	0.2533	0.0738	91.232	None	If, to a very small extent	Ash is white, carbonates none in excess, of sulphates strong traces, chlorine calculated as salt, 0.0127.
230	Porter	1010.08	4.381	4.590	0.3439	0.0928	91.029	None found.	Apparently none used	Ash white, no carbonates to excess, beer is salted, taste strong sour.
231	Lager	1015.39	3.795	5.684	0.2602	0 0760	90.521	None found.	None found	Ash white, no excess of carbonates or salt.
232	Ale	1003.11	6.546	3.705	0 347	0.097	89.749	None found.	Questionable	Ash white, no carbonates to excess, beer is salted.
233	Ale	1011.98	5.631	5.667	0.283	0.0809	88.702	None found.	None	Ash white, no carbonates present in excess, but the beer is salted.
234	Ale	1016.65	4 195	6.175	0.281	0.0714	89.630	None found.	None apparently	Ash white, no carbonates in excess, but salt seems to have been added.
235	Ale	1006.89	3.979	3.588	0.2498	0.0666	92.433	None found.	Questionable	Ash white, no carbonates in excess, beer is salted.
236	Ale	1013.00	3.170	4.844	0.2823	0.0738	91.986	None	Questionable	Ash white, no carbonates present, beer is salted.
237	Ale	1019.03	3.213	6.292	0.311	0.0666	90.495	None	Very likely	Ash white, carbonates not in excess, salt added apparently.
237	Ale	1018.63	3.211	6.193	0.263	0.0576	90.596			By mistake I opened the other bottle and made the second analysis, not knowing that one had been made some weeks previous.
238	Lager	1024.81	3.124	7.695	0.268	0.0866	89.181	None	None	Ash white, no carbonates in excess, no salt added.
239	Lager	1013.71	3.918	5.332	0.271	0.096	90.750	None	None	Ash white, carbonates not in excess, apparently not salted.
240	Lager	1012.98	3.932	5.179	0.251	0.104	90.889	None	None	Ash white, carbonates not in excess, no salt added.
241	Ale	1014.70	4.345	5.785	0.311	0.0817	89.870	None	None	Ash white, carbonates none in excess, beer appears to be salted.
242	Ale	1014.70	5.427	6.213	0.367	0.0756	88.360	None	Apparently used	Ash white, no excess of carbonates, beer is salted.
243	Ale	1008.76	4.820	4.467	0.293	0.0952	90.713	None	None	Ash white, no excess of carbonates, beer is salted apparently.
244	Ale	1010.19	4.775	5.149	0.309	0.106	90.076	None	None	Ash white, carbonates not in excess, beer is salted.
245	Porter	1014.88	4.927	6.051	0.316	0.0995	89.022	None	None	Ash white, carbonates not in excess, beer is salted.

BEER ANALYSIS — Continued.

Number of sample.	Specific gravity.	Percentage of alcohol by weight.	Percentage of extractive matter.	Percentage of ash.	Percentage of phosphoric acid.	Percentage of water.	Substitutes for hops.	Substitutes for malt.	Remarks.
246 Ale	1020.13	2.864	6.430	0.199	0.073	90.706	None	Questionable	Ash white, no excess of carbonates, beer is salted; a young beer, ash rather small in quantity but phosphoric acid corresponding to ash, the use of a malt substitute most likely.
247 Porter	1007.70	5.076	4.275	0.256	0.105	90.649	None	None	Ash white, no excess of carbonates, beer is not salted.
248 Ale	999.44	5.814	2.462	0.239	0.080	91.721	None	Apparently none	Ash white, no excess of carbonates, salt added to the beer; beer was very sour, must be very old or has suffered since leaving the brewery.
249 Ale	1013.56	4.267	5.510	0.235	0.0577	90.223	None	Apparently used	Ash white, no excess of carbonates, beer is salted.
250 Lager	1016.54	3.965	6.032	0.234	0.0613	90.003	None	None	Ash white, no excess of carbonates, no salt used in this beer.
251 Lager	1015.72	4.094	4.929	0.221	0.108	90.977	None	None	Ash white, no excess of carbonates, no salt present in the beer.
252 Ale	1010.97	3.061	4.231	0.259	0.046	92.708	None	Most likely	Ash white, no excess of carbonates, beer is salted, beer, when examined, was not good, being strongly acid.
253 Lager	1014.02	4.515	5.658	0.281	0.114	89.827	None	None	Ash white, no excess of carbonates and no salt present.
254 Ale	1014.70	3.536	5.417	0.212	0.0711	91.047	None	None	Ash white, no excess of carbonates, not salted.
255 Ale	1014.28	3.489	5.358	0.212	0.068	91.153	None	None	Ash white, no excess of carbonates, no salt added.
256 Ale	1009.62	4.499	4.554	0.305	0.0777	90.947	None	Questionable	Ash white, no excess of carbonates, beer is salted.
257 Porter	1012.47	4.716	5.439	0.405	0.0614	89.845	None	Yes, apparently	Ash white, no excess of carbonates, beer is salted.
258 Ale	1015.29	4.438	5.948	0.329	0.0933	89.614	None	None	Ash white, carbonates not in excess, beer is salted.
259 Ale	1016.93	6.308	4.325	0.291	0.091	89.367	None	None	Ash white, no excess of carbonates, beer is salted.
260 Ale	1006.85	6.103	4 499	0.383	0 0737	89.498	None	Apparently used	Ash white, no excess of carbonates, but salt used.
261 Lager	1018.25	3.748	6.412	0.304	0.1054	89.840	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0115 per cent.
262 Lager	1016.89	4.597	6.443	0.3096	0.1019	88.960	None	None	Ash white, no excess of carbonates, sulphates none, chlorine calculated as salt, 0.023 per cent. A very good beer.
263 Lager	1013.54	3.634	5.231	0.2749	0.1026	91.135	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0278. A good sample of beer.
264 Lager	1024.14	2.633	7.376	0.285	0.08818	89.991	None	None	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.0183 per cent.
265 Lager	1019.64	2.861	6.340	0.2593	0.0757	90.799	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0229. A very good sample of beer.
266 Lager	1020.68	3.005	6.786	0.224	0.0842	90.209	None	None	Ash white, carbonates not in excess, sulphates in traces, chlorine calculated as salt, 0.0091. A good sample of beer.
267 Ale	1003.46	5.057	3.181	0.335	0.08133	91.762	None	Apparently	Ash white, no excess of carbonates, sulphates in very strong traces, chlorine calculated as salt, 0.0350 per cent. Beer sour, unfit to drink.
268 Ale	1016.25	3.557	5.825	0.3023	0.112	90.618	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0253 per cent.
269 Porter	1024.36	3.583	7.771	0.3303	0.1134	88.646	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.03893 per cent.
270 Lager	1012.50	4.211	5.197	0.312	0.1107	90.592	None	None	Ash white, no excess of carbonates, sulphates traces, chlorine calculated as salt, 0.0185 per cent.
271 Lager	1020.64	1.260	5.911	0.308	0.111	92.829	None	None	Ash white, no excess of carbonates, sulphates, traces, chlorine calculated as salt, 0.0184. Although a young and light beer it was a good sample.
272 Lager	1010.03	3.730	4.315	0.266	0.0893	91.955	None	None	Ash white, no excess of carbonates, sulphates some traces, chlorine calculated as salt, 0.03249 per cent. Taste good, a very good sample.
273 Lager	1024.72	2 745	7.536	0.337	0.08423	89.719	None	None ?	Ash white, no excess of carbonates, sulphates heavy traces, chlorine calculated as salt, 0.04566 per cent.

274	Lager ...	1017.64	3.346	6.077	0.265	0.0966	90.577	None	None	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.0160 per cent, fair sample of beer.
275	Lager ...	1008.77	3.586	3.918	0.2638	0.06572	92.496	None	Questionable	Ash white, no excess of carbonates, sulphates in strong traces, chlorine as salt, 0.01857 per cent, beer had a sour taste.
276	Lager ...	1013.20	4.006	5.277	0.2662	0.07993	90.717	None	None	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.0115 per cent.
277	Porter .	1018.84	4.780	7.136	0.4401	0.0983	88.084	None	Yes	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0392.
278	Ale	1018.00	4.188	6.537	0.3702	0.0806	89.275	None	Yes	Ash white, no excess of carbonates, sulphates in very strong traces, chlorine calculated as salt, 0.0459.
279	Ale	1005.11	5.316	3.727	0.314	0.06957	90.957	None	Yes	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.0328 per cent, sour very decidedly in taste.
280	Ale	1012.13	4.840	5.368	0.3351	0.07598	89.792	None	Apparently	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt. 0.06487, taste slightly sour.
281	Porter .	1009.47	4.888	4.687	0.407	0.05989	90.425	None	Yes	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.09523 per cent, decidely sour taste.
282	Ale	1017.51	3.069	5.919	0.272	0.0760	91.012	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0506 per cent.
283	Porter .	1019.32	2.995	6.321	0.345	0.06559	90.684	None	Apparently used	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.0943 per cent.
284	Ale	1018.54	5.067	4.769	0.403	0.07856	90.164	None	None	Ash white, carbonates not in excess, sulphates very strong traces, chlorine caldulated as salt. 0.1554 per cent, taste slightly sour.
285	Lager ...	1010.53	4.386	4.745	0.298	0.08356	90.869	None	None	Ash white, no excess of carbonates, sulphates very strong traces indeed, chlorine calculated as salt, 0.03243 per cent.
286	Ale	1008.29	4.938	6.216	0.3116	0.1177	88.846	None	None	Ash white, no excess of carbonates, no salt used.
287	Lager ...	1008.31	3.971	4.015	0.251	0.076	92.014	None	None	Ash white, no excess of carbonates but beer is salted.
288	Ale	1008.78	3.118	3.701	0.272	0.0785	93.181	None	Doubtful	Ash of the beer white, carbonates not in excess, no salt used.
289	Lager ...	1037.00	0.9625	9.6470	0.2872	0.0933	89.4905	None	None	Ash white, no excess of carbonates, sulphate traces, salt calculated from chlorine 0.0922 per cent, beer not salted, a very young beer, unfit to drink in the state it was in when opening the bottle.
290	Lager ..	1010.22	3.331	4.165	0.278	0.101	92.504	None	None	Ash white, no carbonates used, sulphates in traces, chlorine calculated as salt, 0.0067.
291	Ale	1006.52	4.904	3.898	0.353	0.0723	91.198	None	Apparently	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0907, beer is salted.
292	Ale	1002.98	4.265	2.703	0.3108	0.0904	93.032	None	None	Ash white, no excess of carbonate, traces of sulphates, chorine found corresponding to 0.0233 per cent, beer is salted apparently.
293	Porter ..	1011.639	3.719	4.733	0.355	0.0905	91.548	None	None	Ash white, no excess of carbonates, sulphates in strong traces, beer is salted, chlorine calculated as salt, 0.106 per cent.
294	Ale	1009.08	3.791	4.085	0.244	0.0709	92.124	None	None	Ash white, no excess of carbonates, sulphates strong traces, chlorine calculated as salt, 0.086, beer is salted.
295	Ale	1010.98	4.562	4.647	0.228	0.0509	90.791	None	Apparently	Ash white, no excess of carbonates, sulphates strong traces, chlorine calculated as salt, 0.044, beer is salted.
296	Ale	1012.98	3.821	5.141	0.209	0.0566	91.038	None	Questionable	Ash white, no excess of carbonates, sulphates strong traces, chlorine as salt, 0.037, beer is salted.
297	Ale	1004.35	5.401	3.565	0.552	0.0661	91.0310	None	Not very doubtful	Ash white, no excess of carbonates, sulphates very heavy, very heavily salted, the chlorine found corresponds to 0.338 per cent, shall repeat tests
298	Ale	1011.55	3.640	4.927	0.302	0.0747	91.433	None	None	Ash white, no excess of carbonates, sulphates heavy, chlorine as salt calculated 0.0673 per cent, beer is salted.
299	Ale	1009.86	4.565	4.648	0.298	0.0628	90.787	None	Apparently	Ash white, no excess of carbonates, sulphates heavy, chlorine calculated as salt, 0.0245 per cent, beer is salted or the water used contained much chlorine.
300	Porter .	1010.32	3.894	4.459	0.343	0.0806	91.647	None	None apparently	Ash white, no excess of carbonates, sulphates heavy, beer is salted.
301	Ale	1007.05	4.597	3.880	0.374	0.0643	91.523	None	Apparently (phosphoric acid too low for ash.)	Ash white, no excess of carbonates, sulphates heavy, beer is salted.
302	Ale	1010.45	4.011	4.538	0.3036	0.0581	91.451	None	Yes, the phosphoric acid is much too low for ash	Ash white, no excess of carbonates, sulphates very strong traces, beer is salted.

BEER ANALYSIS — Continued.

Number of sample.	Specific gravity.	Percentage of alcohol by weight.	Percentage of extractive matter.	Percentage of ash.	Percentage of phosphoric acid.	Percentage of water.	Substitutes for hops.	Substitutes for malt.	Remarks.
303 Ale	1012.239	4.355	5.173	0.311	0.0705	90.472	None	Apparently used.....	Ash white, no excess of carbonates, sulphates heavy, beer is salted.
304 Lager...	1019.42	3.436	6.563	0.247	0.0977	90.001	None	None	Ash white, no excess of carbonates, sulphates or chlorides, not salted.
305 Lager...	1018.20	3.387	6.270	0.2409	0.0805	90.343	None	None	Ash white, no excess of carbonates, chlorine in strong traces, the same holds good in regard to sulphates.
306 Ale	1013.469	3.366	5.065	0.228	0.0621	91.569	None	Questionable	Ash white, no excess of carbonates, sulphates in very strong traces, chlorine calculated as salt, 0.0323 per cent.
307 Ale	1010.87	3.491	4.403	0.241	0.0475	92.106	None	Apparently used.....	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0416 per cent, beer is salted.
308 Ale	1004.37	4.431	3.146	0.339	0.0797	92.423	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine found corresponds to salt, 0.0838, beer is salted.
309 Porter .	1012.80	4.419	5.338	0.332	0.0847	90.243	None	None apparently.....	Ash white, no excess of carbonates, chlorine found calculated as salt, 0.0694 per cent, beer slightly sour, salted, sulphates in traces.
310 Ale	1010.39	5.889	5.363	0.2219	0.0457	88.748	None	Unquestionably ash too low for extract and alcohol.....	Ash white, no carbonates in excess, salt calculated from chlorine found, 0.0556 per cent, sulphates in traces.
311 Porter..	1011.57	4.5103	5.1103	0.170	0.0815	90.3794	None	None	Ash white, no excess of carbonates, sulphates absent, salt only in traces.
312 Lager....	1022.53	3.638	7.413	0.2521	0.0997	88.949	None	None	Ash white, no excess of carbonates, no sulphates present, chlorine calculated as salt, 0.0045 per cent.
313 Weiss...	1012.05	1.265	3.692	0.315	0.0659	95.043	None	None	Ash white, no excess of carbonates, heavy traces of sulphates, chlorine calculated as salt, 0.0554 per cent, a kind of Weiss beer, slightly sour.
314 Weiss...	1003.40	2.004	1.799	0.0976	0.03317	96.197	None	None	Ash white, no excess of carbonates, sulphates in traces, salt none, a kind of Weiss beer, beer is somewhat sour.
315 Weiss...	1003.54	3.002	2.311	0.129	0.0421	94.687	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0023, a kind of Weiss beer.
316 Lager....	1011.77	3.553	4.659	0.274	0.097	91.738	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0092.
317 Lager....	1016.85	5.728	6.955	0.216	0.0859	87.317	None	None	Ash white, no excess of carbonates, sulphates in very slight traces, chlorine faint trace.
318 Lager....	1014.26	4.119	5.605	0.262	0.0950	90.276	None	None	Ash white, no excess of carbonates, sulphates in very faint traces, chlorine calculated as salt, 0.0046.
319 Ale	1024.14	3.147	7.569	0.297	0.0922	89.284	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0256 per cent.
320 Porter ..	1026.04	3.890	8.340	0.325	0.08306	87.770	None	None ?.....	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.045 per cent.
321 Lager. ..	1012.83	4.069	4.935	0.209	0.08139	90.996	None	None	Ash white, no excess of carbonates, no sulphates present, salt in traces, somewhat pitchy taste.
322 Lager....	1014.65	3.505	5.479	0.233	0.08616	91.016	None	None	Ash white, carbonates not in excess, sulphates in strong traces, chlorine calculated as salt, 0.0254 per cent.
323 Lager...	1018.81	3.828	6.584	0.216	0.0926	89.588	None	None	Ash white, no excess of carbonates, no sulphates, salt in traces, 0.0023 per cent, beer has a somewhat pitchy taste, otherwise very good.
324 Lager...	1016.55	4.040	5.864	0.214	0.0869	90.096	None	None	Ash white, no excess of carbonates, no sulphates present, chlorine calculated as salt, 0.0023 per cent.
325 Lager...	1018.19	4.446	6.737	0.1987	0.0912	88.817	None	None	Ash white, no excess of carbonates, sulphates, none present, chlorine a trace. A fine sample of beer.

326 Porter..	1004.99	3.365	2.843	0.2959	0.1155	93.792	None	None	Ash white, no exces. of carbonates, chlorine calculated as salt, 0.0046 per cent, sulphates strong traces.
327 Ale	1016.44	5.471	6.724	0.286	0.1153	87.805	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0046 per cent, sulphates in traces.
328 Ale	1003.97	6.135	3.777	0.263	0.116	90.088	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.035 per cent, traces of sulphates
329 Porter..	1018.92	3.781	6.606	0.2925	0.0822	89.613	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0391 per cent, sulphates in strong traces.
330 Ale	1018.17	4.437	6.711	0.298	0.1016	88.852	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0368 per cent, of sulphates strong traces.
331 Porter..	1018.92	2.782	6.142	0.452	0.0816	91.076	None	None?.....	Ash white, no excess of carbonates, chlorides determined as salt, 0.1314 per cent, heavily salted beer, sulphates very strong traces
332 Ale	1022.02	2.700	6.878	0.2393	0.07165	90.422	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0228 per cent, sulphates strong traces,
333 Porter .	1022.62	3.993	7.479	0.307	0.118	88.528	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.064, strong traces of sulphates.
334 Lager...	1022.55	3.934	7.469	0.2173	0.090	88.597	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0343 per cent, sulphates in traces, Fine sample of beer.
335 Lager....	1017.55 .	3.845	6.259	0.248	0.1149	89.896	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0023 per cent, sulphates none. Very fine sample, has a slightly pitch taste.
336 Ale	1014.88	6.439	6.721	0.3197	0.1285	86.840	None	None	Ash white, no excess of carbonates, chlorides calculated as salt, 0.0023, sulphates not present.
337 Lager....	1018.96	3.280	6.385	0.282	0.0999	90.335	None	None	Ash white, no excess of carbonates, chlorine as salt calculated, 0.0023 per cent, sulphates none. Taste somewhat pitchy.
338 Lager....	1018.17	3.685	6.346	0.2407	0.0907	89.969	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0091, sulphates not present. Fine sample of beer.
339 Lager...	1022.27	3.190	7.243	0.215	0.0887	89.567	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0023 per cent, no sulphates present.
340 Lager...	1017.68	3.897	6.322	0.249	0.0737	89.781	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0023, no sulphates present. Fine sample of beer.
341 Lager....	1018.03	2.359	6.196	0.2252	0.0971	92.445	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0023 per cent, sulphates none. Fine sample, taste somewhat pitchy.
342 Lager....	1015.64	4.077	5.891	0.1856	0.0836	90.0032	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0023, sulphates none. Fine sample of beer.
343 Weiss...	1005.70	0.889	2.767	0.115	0.0413	96.344	None	None	Ash white, no excess of carbonates, chlorides calculated as salt, 0.037, sulphates in traces. Is a kind of Weiss beer.
344 Lager...	1020.43	3.564	6.876	0.213	0.0835	89.560	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0023, no sulphates. Good gample of beer.
345 Lager...	1017.53	4.181	6.467	0.250	0.1012	89.352	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0115, sulphates in very strong traces.
346 Lager...	1014.56	3.617	5.444	0.1831	0.0754	90.939	None	None	Ash white, no carbonates in excess, chlorine calculated as salt, 0.0023 sulphates none.
347 Lager...	1019.58	3.382	6.577	0.2809	0.1117	90.041	None	None	Ash white, no excess of carbonates chlorine only a trace, no sulphates.
348 Weiss...	1005.88	1.611	2.262	0.263	0.0476	96.127	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.1676 per cent, beer heavily salted. A kind of Weiss beer.
349 Weiss...	1005.65	1.926	2.341	0.161	0.0746	95.733	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0325, sulphates in traces. A kind of Weiss beer.
350 Ale	1010.18	4.125	4.534	0.227	0.0696	91.341	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0116, sulphates present in strong traces.
351 Lager...	1016.94	4.147	6.242	0.412	0.0853	89.611	None	Yes	Ash of the beer white, no excess of carbonates, sulphates a very considerable quantity, chlorine calculated as salt, 0.0156 per cent.
352 Ale	1009.63	5.579	5.051	0.357	0.09381	89.370	None	None	A good tasting beer. Ash white, no excess of carbonates, sulphates considerable, chlorine calculated as salt, 0.0785 per cent.
353 Ale	1015.56	4.205	5.894	0.3621	0.0840	89.901	None	Questionable	Ash white, no excess of carbonates, sulphates very considerable, chlorine calculated as salt, 0.0575 per cent.
354 Ale	1015.42	3.954	5.757	0.3451	0.0826	90.289	None	None	Ash white, no excess of carbonates, sulphates in considerable quantity, chlorine as salt calculated, 0.0576.
355 Porter..	1008.94	5.657	4.885	0.470	0.1140	89.458	None	None	Ash white, no excess of carbonates, sulphates considerable, chlorine calculated as salt, 0.0789 per cent.

BEER ANALYSIS — Continued.

Number of sample.	Specific gravity.	Percentage of alcohol by weight.	Percentage of extractive matter	Percentage of ash.	Percentage of phosphoric acid.	Percentage of water.	Substitutes for hops.	Substitutes for malt.	Remarks.
356 Lager...	1022.25	3.474	7.325	0.2016	0.08116	89.101	None	None? May be so-called rice beer	Ash white, no excess of carbonates, sulphates strong traces, chlorine calculated as salt, 0.0114. An excellent beer in appearance and taste.
357 Porter.	1015.46	4.524	6.039	0.313	0.0828	89.437	None	None	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.0368.
358 Lager...	1016.09	5.582	6.661	0.2383	0.06266	87.757	None	Yes	Ash and phosphoric acid in too small quantities as compared to alcohol and extract. Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.0115.
359 Ale	1015.31	4.019	5.829	0.3144	0.09264	90.152	None	None	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.0184 per cent.
360 Weiss...	1012.74	1.943	4.143	0.340	0.03057	93.914	None	Questionable	Ash white, no excess of carbonates, sulphates strong traces, chlorine calculated as salt, 0.226, heavily salted. Kind of small or Weiss.
361 Lager ..	1010.14	4.369	4.609	0.2351	0.0598	91.022	None	Questionable	Ash white, no excess of carbonates, sulphates a considerable quantity, salt calculated from chlorine, 0.6046.
362 Ale	1019.16	2,708	6.102	0.2832	0.0805	91.190	None	None	Ash white, no excess of carbonates, sulphates strong traces, chlorine calculated as salt, 0.0805. A very young beer.
363 Lager...	1019.31	3.376	6.493	0.354	0.0678	90.131	None	Yes?	Ash white, no excess of carbonates, sulphates strong traces, chlorine calculated as salt, 0.0734.
364 Ale	1007.52	3.288	3.455	0.223	0.0662	93.257	None	None	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.06051 per cent.
365 Ale	1009.06	3.381	3.918	0.1991	0.0690	92.701	None	None	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.0533.
366 Ale	1011.88	3.588	4.715	0.2022	0.06067	91.697	None	None	Ash white, no excess of carbonates, sulphates strong traces, chlorine calculated as salt, 0.0370 per cent.
367 Lager...	1007.11	3.956	3.655	0.1994	0.0669	92.380	None	None	Ash white, no excess of carbonates, sulphates considerable traces, chlorine calculated as salt, 0.0325.
368 Lager...	1007.09	4.240	3.753	0.1740	0.069	92.007	None	None	Ash white, no excess of carbonates, sulphates none but a mere trace, chlorine calculated as salt, 0.0069.
369 Ale	1013.62	3.523	5.172	0.1976	0.06069	91.305	None	None	Ash white, no excess of carbonates, sulphates strong traces, chlorine calculated as salt, 0 0185.
370 Ale	1009.52	7.679 !	5.829	0.2629	0.0805	86.492	None	None?.....	Ash white, no excess of carbonates, sulphates very considerable, chlorine calculated as salt, 0.0232. Beer is slightly sour.
371 Ale	1014.27	3.865	5.478	0.2132	0.0573	90.637	None	None apparently.....	Ash white, no excess of carbonates, sulphates strong traces, chlorine as salt calculated, 0.0103.
372 Lager...	1015.36	1.583	4.636	0.3438	0.0887	93.731	None	None	Ash white, no excess of carbonates, sulphates in considerable quantities, chlorine calculated as salt, 0.0415. Apparently Weiss or light and young.
373 Ale	1009.51	3.9705	4.2878	0.2281	0.0660	91.7417	None	None	Ash white, no excess of carbonates, sulphates strong traces, chlorine calculated as salt, 0.0116.
374 Ale	1007.72	5.4102	4.456	0.3257	0.0932	90.134	None	None	Ash white, no carbonates, no sulphates, chlorine calcu'ted as salt, 0.0442.
375 Ale	1006.10	3.083	2.998	0.471	0.097	93.919	None	Yes.....	Remarkable for large amount of ash and phosphoric acid in comparison to alcohol and extract, one bottle entirely spoiled, beer in other rather sour. Ash white, no excess of carbonates, sulphates very considerable quantity, salt calculated from chlorine found, 0.056.
376 Ale	1016.149	4.169	6.065	0.374	0.0762	89.766	None	Apparently.....	Ash white, no excess of carbonates, sulphates considerable quantity, salt calculated from chlorine found, 0 0668.

377 Porter .	1006.23	4.537	3.688	0.460	0.09582	91.775	None	Yes.....	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0672, sulphates considerable. Beer is sour.
378 Ale	1005.38	4.381	3.399	0.5179	0.10077	92.220	None	Yes.....	Ash white, no excess of carbonates, chlorides calculated as salt, 0.0839 per cent, sulphates very strong traces indeed, a very light beer for porter. Taste sour.
379 Lager...	1022.20	2.934	7.082	0.372	0.0533	89.984	None	Yes.....	Ash white, no excess of carbonates, chlorine calculated as salt, 0.03437, sulphates very strong traces indeed.
380 Ale	1010.39	4.344	4.685	0.394	0.07305	90.871	None	Yes.....	Ash white, no excess of carbonates, chlorine as salt calculated, 0.06264, sulphates very heavy traces indeed.
381 Lager....	1011.28	4.402	4.957	0.2294	0.07143	90.641	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.00493, sulphates none.
382 Porter ..	1011.90	6.695	6.044	0.426	0.1085	87.261	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.07646 per cent, sulphates in very strong traces.
383 Ale	1019.96	5.111	7.442	0.309	0.05476	87.447	None	Yes.....	Ash and phosphoric acid in too small quantities as compared with extract and alcohol. Ash white, no excess of carbonates, chlorine calculated as salt, 0.05476, sulphates strong traces.
384 Ale	1013.81	2.963	4.986	0.278	0.0596	92.051	None	None ?.....	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0889.
385 Lager....	1007.99	5.026	4.350	0.282	0.09829	90.624	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0023, sulphates none.
386 Lager...	1019.76	3.721	6.795	0.2304	0.06731	89.484	None	Questionable	Ash white, no excess of carbonates, chlorides calculated as salt, 0.00229, sulphates strong traces.
387 Ale	1011.29	4.367	4.899	0.2699	0.0867	90.734	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.05553 per cent, sulphates strong traces.
388 Porter .	1006.89	4.924	4.021	0.3081	0.1028	91.055	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.02791, very strong traces of sulphates. Too sour and mouldy to be drunk.
389 Ale	1008.99	8.193	5.894	0.303	0.07714	85.913	None	Yes.....	Ash much less than the alcohol and extract would allow us to suppose, same in regard to phosphoric acid. Ash white, no excess of carbonates, chlorine calculated as salt, 0.0438, sulphates consid'able quantity
390 Lager....	1013.98	3.910	5.443	0.2389	.....	90.647	None	Doubtful	Ash white, no excess of carbonates, chlorine calculated as salt, 0.01848, traces of sulphates.
391 Ale	1004.74	5.761	3.823	0.3475	0.0887	90.416	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.07224, sulphates present in very strong traces.
392 Porter .	1011.99	4.423	5.160	0.3967	0.1163	90.417	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0716, sulphates very strong traces, taste of beer rather sour.
393 Ale	1011.00	5.542	5.385	0.3397	0.09524	89.073	None	None	Ash white, carbonates not in excess, chlorine calculated as salt, 0.0579, sulphates in strong traces.
394 Ale	1016.32	4.725	6.141	0.3883	0.1031	89.134	None	None	Ash white, no excess of carbonates, chlorides calculated as salt, 0.0609, sulphates very strong traces.
395 Porter .	1026.55	4.815	8.922	0.5484	0.1139	86.263	None	None ?.....	Ash white, no excess of carbonates, chlorine calculated as salt, 0.1414, sulphates very strong traces, beer has a sour taste.
396 Ale	1012.489	3.686	4.937	0.268	0.08077	91.377	None	None	Ash white, carbonates not in excess, chlorine calculated as salt, 0.0393, sulphates strong traces.
397 Ale	1016.07	4.049	5.999	0.4063	0.0817	89.952	None	Questionable.....	Ash white, no excess of carbonate, chlorine calculated as salt, 0.1244, sulphates strong traces.
398 Lager...	1020.88	4.151	7.263	0.3024	0.1026	88.586	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.00229.
399 Lager...	1025.06	3.373	7.955	0.2523	0.0865	88.672	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0034, sulphates none. Fair sample of good beer.
400 Ale	1011.11	4.311	5.631	0.2445	0.08273	90.358	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0415, sulphates strong traces.
401 Ale	1006.42	5.282	4.056	0.3176	0.1125	90.662	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0232 per cent.
402 Porter ..	1026.98	3.092	8.184	0.309	0.10182	88.724	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.03416 per cent.
403 Ale	1022.43	6.756	8.651	0.511	0.1661	84.593	None	None	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.04348 per cent. A very strong and heavy beer.
404 Ale	1019.98	4.098	7.024	0.236	0.09217	88.878	None	None	Ash white, no excess of carbonates, sulphates in very strong traces, chlorine calculated as salt, 0.0183 per cent.
405 Ale	1016.40	4.435	5.985	0.2244	0.0780	89.590	None	None	Ash white, no excess of carbonates, sulphates strong traces, chlorine calculated as salt, 0.02073 per cent.

BEER ANALYSIS — Continued.

Number of sample.	Specific gravity.	Percentage of alcohol by weight.	Percentage of extractive matter.	Percentage of ash.	Percentage of phosphoric acid.	Percentage of water.	Substitutes for hops.	Substitutes for malt.	Remarks.
406 Ale	1002.10	5.394	2.976	0.290	0.1227	91.630	None	None	Ash white, no excess of carbonates, sulphates none, chlorine calculated as salt, 0.02106.
407 Lager	1014.28	3.194	5.190	0.2906	0.09268	91.616	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0138 per cent.
408 Lager	1017.67	3.056	5.932	0.2301	0.0794	91.012	None	None	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.023. A very good sample of beer.
409 Lager	1011.76	4.612	5.177	0.2419	0.08151	90.211	None	None	Ash white, no excess of carbonates, sulphates in very strong traces, chlorine calculated as salt, 0.0463 per cent.
410 Lager	1015.41	4.659	6.101	0.309	0.1063	89.240	None	None	Ash white, carbonates not in excess, sulphates in strong traces, chlorine calculated as salt, 0.0092 per cent.
411 Lager	1017.97	4.004	6.457	0.2557	0.9385	89.539	None	None	Ash white, no excess of carbonates, sulphates in very slight traces, chlorine calculated as salt, 0.0506 per cent.
412 Ale	1010.69	3.381	4.318	0.2409	0.06085	92.301	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0510 per cent.
413 Lager	1016.20	4.2104	6.0608	0.3207	0.10313	89.7288	None	None	Ash white, no excess of carbonates, sulphates in very strong traces, chlorine calculated as salt, 0.009209 per cent.
414 Lager	1019.24	3.260	6.431	0.316	0.0856	90.309	None	None?	Ash white, no excess of carbonates, sulphates very heavy traces indeed, chlorine calculated as salt, 0.0229 per cent.
415 Lager	1011.45	4.344	4.978	0.206	0.0716	90.678	None	None	Ash white, no excess of carbonates, sulphates in very strong traces, chlorine calculated as salt, 0.0092 per cent. A very fine sample of beer.
416 Lager	1011.54	7.061	6.091	0.3498	0.08953	86.848	None	Yes	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.0162 per cent.
417 Ale	1009.29	3.392	3.962	0.2334	0.0624	92.646	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.04407 per cent.
418 Porter	1013.41	3.684	5.192	0.2480	0.06167	91.124	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0300 per cent.
419 Lager	1011.64	3.410	4.588	0.266	0.0886	92.002	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0278 per cent.
420 Ale	1015.64	4.997	6.293	0.308	0.0963	88.710	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0253 per cent.
421 Porter	1016.58	3.553	6.151	0.2831	0.08685	90.296	None	None	Ash white, no excess of carbonates, sulphates strong traces, chlorine calculated as salt, 0.02305 per cent.
422 Ale	1019.94	3.790	6.835	0.2702	0.06971	89.375	None	Apparently none	Ash white, no excess of carbonates, sulphates in very strong traces, chlorine calculated as salt, 0.0206 per cent.
423 Ale	1026.38	3.208	8.077	0.2903	0.06739	88.715	None	None, probably	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.04339 per cent.
424 Ale	1005.99	6.257	4.344	0.347	0.08477	89.399	None	None?	Ash white, no excess of carbonates, sulphates strong traces, chlorine calculated as salt, 0.0652 per cent.
425 Ale	1020.98	7.304	8.527	0.51081	0.14255	84.169	None	None	Ash white, no excess of carbonates, sulphates strong traces, chlorine calculated as salt, 0.05735 per cent. A remarkably strong, heavy beer.
426 Weiss	1001.83	1.695	1.277	0.126	0.0311	97.028	None	None	Ash white, no excess of carbonates, sulphates heavy, chlorine calculated as salt, 0.0443 per cent. Should not be called beer.
427 Porter	1010.38	5.882	5.375	0.543	0.1161	88.743	None	None	Ash white, no excess of carbonates, sulphates very heavy, chlorine calculated as salt, 0.0975 per cent. Beer somewhat sour.
428 Weiss	1002.46	1.355	1.294	0.157	0.0315	97.351	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0887.

429 Lager..	1016.93	3.887	6.124	0.203	0.0818	89.989	None	None	A very fine glass of beer. Ash white, no carbonates in excess, salt only in traces, no sulphates.
430 Ale	1014.92	4.319	5.831	0.238	0.0818	89.850	None	None	Ash white, no excess of carbonates, sulphates very strong, chlorine calculated as salt, 0.03 per cent.
431 Porter..	1013.58	4.446	5.551	0.309	0.0747	90.003	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, equal to 0.161 per cent. Beer is not sour (heavy salted).
432 Ale	1015.76	4.271	6.014	0.292	0.0841	89.715	None	None	Ash white, no carbonates in excess, sulphates very heavy, chlorine calculated as salt, 0.076 per cent. Beer is not sour
433 Porter..	1022.37	3.783	7.450	0.371	0.0785	88.767	None	None	Ash white, no excess of carbonates, sulphates rather heavy, chlorine calculated as salt, 0.135 per cent (heavy salted). Has slight sour taste.
434 Lager....	1012.83	2.670	4.554	0.206	0.0723	92.776	None	None	A very light beer (perhaps so-called present-use beer), taste slightly sour. Ash white, no excess of carbonates, sulphates absent, chlorine calculated as salt, equal to 0.0069.
435 Lager....	1022.32	3.424	7.401	0.256	0.1026	89.175	None	None	Ash white, no excess of carbonates, no sulphates, chlorine calculated as salt, 0.0068 per cent. Beer has a fair taste, is not sour.
436 Lager ...	1018.75	1.584	5.537	0.172	0.0671	92.879	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0045 per cent.
437 Lager....	1015.22	2.825	5.255	0.204	0.084	91.920	None	None	Ash white, no excess of carbonates, sulphates absent, chlorine calculated as salt, equal to 0.004 per cent.. Beer has a pitchy taste.
438 Porter..	1009.49	5.671	5.044	0.350	0.1038	89.285	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0347 per cent. This porter is rather sour in taste.
439 Lager..	1017.21	3.554	6.066	0.241	0.0866	90.380	None	None	Ash white, no excess of carbonates, chlorine in traces, no sulphates.
440 Lager....	1016.41	4.242	6.163	0.237	0.0938	89.595	None	None	Ash white, no excess of carbonates, sulphates absent, chlorine calculated as salt, 0.0045 per cent.
441 Lager....	1018.16	3.944	6.472	0.240	0.0958	89.584	None	None	Ash white, no carbonates in excess, no sulphates, chlorine calculated as salt, 0.004 per cent.
442 Weiss...	1004.01	0.964	1.407	0.096	0.0264	98.495	None	None	Ash white, no carbonates in excess, sulphates very heavy, chlorine calculated as salt, 0.0104 per cent. This should not be called beer. Taste sour, but not excessive.
443 Lager ...	1015.16	3.999	5.750	0.234	0.0865	90.251	None	None	Ash white, no excess of carbonates, no sulphates present, chlorine calculated as salt, 0.0046 per cent.
444 Lager..	1017.47	3.140	5.935	0.2249	0.0852	90.925	None	None	Ash white, no excess of carbonates, no sulphates, chlorine but in traces.
445 Lager....	1017.59	2.945	5.882	0.232	0.0936	91.173	None	None	Ash white, no excess of carbonates, no sulphates present, chlorine only in traces.
446 Lager ...	1022.01	2.922	7.001	0.2701	0.0959	90.078	None	None	Ash white, no excess of carbonates, no sulphates present, chlorine calculated as salt, equal to 0.0091 per cent.
447 Ale	1019.46	5.130	7.323	0.270	0.0893	87.547	None	None	Ash white, no excess of carbonates, sulphates very heavy, chlorine calculated as salt, 0.0229 per cent. Beer is not sour.
448 Lager ..	1017.26	3.146	5.978	0.278	0.0866	90.876	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.016 per cent. Beer has a fair taste and is not sour.
449 Lager...	1013.19	4.791	5.193	0.262	0.0777	90.016	None	None	Ash white, no excess of carbonates, sulphates very heavy, chlorine calculated as salt, 0.0115 per cent.
450 Lager ..	1015.01	3.397	5.423	0 246	0.0704	91.180	None	None	Ash white, no excess of carbonates, sulphates heavy, chlorine calculated as salt, 0.0184 per cent.
451 Lager....	1018.15	3.728	6.361	0.249	0.0873	89.911	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0112 per cent.
452 Lager ...	1014.44	3.006	5.1205	0.3024	0.0655	91.874	None	Apparently	Ash white, no excess of carbonates, sulphates very heavy, chlorine calculated as salt, 0.02077. This sample of beer, though a late one, was too sour to drink.
453 Lager ..	1013.52	6.972	6.459	0.293	0.0632	89.569	None	Yes, hardly doubtful.	Ash white, no excess of carbonates, sulphates considerable, chlorine calculated as salt, 0.0208. Phosphoric acid very low as compared to the total ash.
454 Ale*	1022.16	2.707	6.932	0.322	0.113	90.361	None	None ?.....	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt 0.0757 per cent. Beer has a sour taste.
455 Porter..	1019.91	4.152	6.769	0.321	0.080	89.079	None	None ?.....	Ash white, no excess of carbonates, sulphates heavy, chlorine calculated as salt, 0.0469 per cent.

* India pale.

BEER ANALYSIS — Continued.

Number of sample.	Specific gravity.	Percentage of alcohol by weight.	Percentage of extractive matter.	Percentage of ash.	Percentage of phosphoric acid.	Percentage of water.	Substitutes for hops.	Substitutes for malt.	Remarks.
456 Lager ..	1015.78	2.971	5.452	0.240	0.0875	91.577	None	None	Ash white, no excess of carbonates, strong traces of sulphates, chlorine calculated as salt, 0.0069 per cent.
457 Lager ...	1020.38	3.575	6.875	0.1805	0.0597	89.550	None	None	Ash white, no excess of carbonates, sulphates in traces. A very fine sample of beer.
458 Weiss..	1005.46	0.755	1.725	0.222	0.0315	97.520	None	Yes apparently.....	Ash white, no excess of carbonates, sulphates present, chlorine calculated as salt, 0.0069 per cent.
459 Ale	1022.42	3.096	7.181	0.352	0.06082	89.723	None	Yes	The phosphoric acid much too low for ash. Ash white, no excess of carbonates, sulphates very heavy, chlorine calculated as salt, 0.0309,
460 Weiss...	1007.78	1.873	2.855	0.235	0.0396	95.272	None	Apparently	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0522 per cent.
461 Weiss...	1007.09	0.8029	2.219	0.285	0.0287	96.978	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.211, very heavily salted, no beer in the proper sense of the word.
462 Weiss...	1004 39	1.975	2.010	0.1833	0.048	96.015	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0793 per cent, sulphates in traces.
463 Lager*..	1003.97	4.819	3.219	0.151	0.0598	91.962	None	None	Ash white, no excess of carbonates, sulphates absent, chlorine a trace.
464 Porter .	1015.34	5.083	6.294	0.325	0.09137	88.623	None	None	Ash white, no excess of carbonates, sulphates considerable, chlorine in traces. The beer had a very slight acid taste.
465 Ale†	1009.18	5.878	5.011	0.295	0.0797	89.111	None	None	Ash white, no excess of carbonates, sulphates strong, chlorine calculated as salt, 0.0162 per cent,
466 Lager‡ .	1017.44	3.4501	6.056	0.230	0.0719	90.494	None	None	Ash white, no excess of carbonates, sulphates absent, chlorine in traces. Taste rather sour.
467 Lager§ .	1017.72	4.505	6.606	0.293	0.0957	88.889	None	None	Ash white, no excess of carbonates, sulphates absent, chlorine in traces. This beer had a rather sour taste.
468 Ale‖	1015.09	2.636	5.177	0.314	0.0774	92.187	None	None?	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.0092 per cent. A fine hop-flavored sample of beer.
469 Ale	1010.00	4.304	4.569	0.234	0.0749	91.127	None	None	Ash white, no excess of carbonates, no sulphates present, chlorine calculated as salt, 0.057 per cent.
470 Lager ...	1013.28	4.302	5.414	0.226	0.0889	90.284	None	None	Ash white, no excess of carbonates, sulphates absent, chlorine a trace.
471 Lager ...	1018.58	4.110	6.659	0.236	0.1008	89.231	None	None	Ash white, no excess of carbonates, sulphates absent, chlorine a trace. A good sample of beer.
472 Lager...	1014.75	3.714	5.534	0.255	0.1059	90.752	None	None	Ash white, no excess of carbonates, sulphates absent, chlorine a trace,
473 Lager...	1012.82	4.035	5.061	0.2604	0.1204	92.904	None	None	Ash white, no excess of carbonates, sulphates none, chlorine in traces. A good sample of beer.
474 Lager...	1010.79	4.245	4.748	0.239	0.108	91.007	None	None	Ash white, no excess of carbonates, no sulphates, chlorine a trace.
475 Lager...	1020.05	3.720	6.870	0.292	0.0574	89.410	None	Questionable	Ash white, no excess of carbonates, sulphates present, the chlorine calculated as salt equal to 0.0367 per cent. Beer slightly sour.
476 Lager...	1015.31	3.858	5.764	0.295	0.1056	90.378	None	None	Ash white, no carbonates in excess, sulphates present in traces, chlorine calculated as salt, 0.023 per cent. Beer had a sour taste.

* Kaiser Lager. † India Pale Ale. ‡ German Lager. § Bavarian Lager. ‖ Bass' Ale.

It will be seen that no substitute for hops nas oeen found, and that as regards substitutes for malt, the chemist speaks with great caution. He suspects the addition of glucose in several instances, but cannot pronounce on this point with any degree of certainty. No harmful ingredient has, however, been detected.

NORMAL BEER.

Do these analyses show a violation of the law in respect to containing ingredients that are "not normal or healthful to exist in such beverages?" On an affirmative reply to this question will depend the future action of the Board in the matter of prosecution. Manifestly before an answer can be given it will be necessary to have a clear understanding of what is a normal beer. Unfortunately, however, there exists no statutory definition, nor, in fact, any agreement among those supposed to be authorities.

ATCHERLY, in reference to what ought to be the composition of beer, says:

"Beer is the fermented infusion of malted barley flavored with hops which, by law (English), are the only substances permitted to be used in its manufacture. How far this law is carried out is a matter which only analysis can determine."

HASSALL says: "Malt beverages should consist solely *of the product of malt and hops*, the former of which has been subjected to fermentation, and all varieties of these beverages should be due to these and these alone, the color should be due solely to the degree of heat to which the malt has been subjected in the kiln and to the ripeness and color of the hops employed;" and adulteration is defined as follows: "Any other substances than the constituents of malt and their derivatives, hops and water in such proportion as in the case of stout, strong and pale ale, to reduce the absolute alcohol to less than 4.5 per cent, and in porter and beer to under 3.5 per cent. Although the law allows the addition of both sugar and salt we regard these additions as adulteration."

On the other hand malt may be derived from other grains than barley and in fact is. Webster defines malt as "barley or *other grain* steeped in water till it germinates, and then dried in a kiln thus evolving the saccharine principle." While a gentleman who evidently takes a somewhat liberal view, defines normal lager to be "a fermented beverage, not less than six months old, made from any starchy grain, and rendered bitter to suit the consumers' palate."

There seems to be, therefore, an agreement in defining malt beverages as being composed solely of malt and hops; but a difference in regard to the kind of grain from which malt is to be derived, some claiming

that it should be confined to barley alone and others taking a wider latitude. It is evident that until a normal standard of beer is determined upon the present law will have little effect.

By way of ascertaining the views taken on this subject by the leading brewers of the country, correspondence was instituted with the Brewers' Association, and the following letter from the secretary will be read with interest.

ALFRED LUDLOW CARROLL, M. D., *Secretary:*

DEAR SIR — Availing myself of your kind permission I take the liberty to inform you that, at a meeting of the Advisory Committee of the United States Brewers' Association, Dr. Schwarz and I submitted your timely suggestion in reference to normal beer, recommending that the matter be referred to the Board of Trustees of the Association at its annual convention in May next. The committee, at once, passed a resolution to that effect and instructed me to transmit to you a copy of the same, and to assure you that the brewing trade is under many obligations to you for the interest you have manifested in our efforts to offer to the public a pure article.

Personally, I may be permitted to add, that you can do immense good by clearly stating in your official report what brewers should be allowed to use in the manufacture of beer and what not. So many prejudices are at present being aroused by biased persons against beer, and the ignorance of a great mass of the people on scientific subjects is so frequently appealed to in an insidious way that an official utterance from a competent authority as to what constitutes adulterations would greatly aid the honest brewers. At the same time you cannot, I think, serve the public better than by condemning, as severely as possible, the use of deleterious stuffs, and by recommending practicable laws of the utmost stringency for the punishment of adulterators."

G. THOMANN.

The following is the resolution referred to:

"*Resolved*, That this Committee submit to the United States Brewers' Association, at its next convention, the proposition of establishing a normal standard for the character of malt beverages so far as ingredients and age are concerned."

MODERN BREWING.

There are various contrivances resorted to by which time and labor may be saved, but whether in doing so the quality of the brew is improved may well be questioned. Of course all brewers had to learn their first lesson in malting the grain and converting its starch into sugar from nature, for this is really what nature does to provide the sweet fluid for the sustenance of her young.* Starch and gluten constitute the chief components of all grains, and they are designed to form the first nutriment

* Chemistry of Common Life.— JOHNSTON.

for the tender plant; but being in their natural state insoluble in water, they cannot pass from the body of the seed to sustain the growing germ. As the sprouting, however, proceeds, chemical changes take place at the base of the germ, the gluten being changed into a white soluble substance called *diastase*, which acting on the starch converts it into grape sugar, which is soluble in water, and can thus in a liquid form be utilized for purposes of nutrition.

The brewers at first caused the grain to sprout, thus producing diastase from the gluten, and thereby converting the starch into sugar, reduced to liquid form by the addition of water. The addition of yeast to this wort would split it up into alcohol and carbonic acid in the process of fermentation, and being flavored with hops would in due time form a pure and wholesome beverage. In the march of progress, however, man seeks to improve upon nature and science is called to his aid to enable him to do it. It was soon ascertained that a certain characteristic of the diastase pointed out the way for abbreviating the labor of brewing. Good malt was found to contain one pound of diastase to every hundred pounds of starch contained in the grain, and that this pound of diastase was capable of changing into grape sugar, not only one hundred pounds of starch, but ten times that amount; hence the brewer found that the diastase of a certain portion of malt was sufficient to change not only all the starch it contained into sugar, but the starch in many times that amount, and that raw grain could be added, thus avoiding the expense and time of malting the latter. This was the first departure from nature's slow and certain method; whether an improvement or not is open to question.

Another property of the diastase was discovered to be that heating the solution containing it to the boiling point, destroyed its power of changing starch into sugar. This determined the time when the wort might be safely boiled, and the hops introduced, which of course ought not to be until the starch had all been changed.

While some brewers have malting departments connected with their breweries, others, adopting perhaps the principle of division of labor, purchase their malt already prepared, and thus the malt business separate from the brewing, has grown to considerable dimensions in this State.

The brewer then commences where the maltster leaves off, and is saved the work of steeping, germinating and roasting the grain. While some brewers profess to use only malted grain in the manufacture of their beers, others frankly admit the mixing with it of glucose. Before,

however, discussing the effect of this practice, it may not be devoid of interest to note the difference in the processes of brewing lager beer as distinguished from ale and porter, the consumption of lager so greatly preponderated in this State.

* It has been ascertained that the temperature at which the fermentation of the beer has taken place exerts a great effect on its keeping properties, and on its liability to become sour from the formation of acetic acid. When the wort is at a high temperature the action of the yeast is very brisk and the large bubbles of carbonic acid formed carry the yeast globules to the surface of the liquid where it forms a thick scum. The fermentation is called top fermentation. The scum prevents the access of the oxygen of the air to the fermenting fluid, and the yeast takes, therefore, the oxygen necessary for its formation from the sugar contained in the liquid. The sugar is thus destroyed before the whole of the nitrogenous matter held in solution has been used up by the yeast. The beer after it has been drawn off contains, therefore, in the case of top fermentation, nitrogenous matter, which acting as a ferment induces the oxidation of the alcohol and the formation of acetic acid. When, on the other hand, the wort is fermented at a low temperature, as is the case in the preparation of Bavarian beer, carbonic acid escapes from the liquid in minute bubbles, and the yeast is not carried to the top but remains at the bottom. Hence this mode of fermentation is called bottom fermentation. The oxygen of the air has free access to the liquid and consequently the yeast takes the necessary oxygen from the air instead of the sugar, as in the previous case and the nitrogenous matter is wholly converted into yeast before all the sugar is decomposed. The beer thus prepared contains, therefore, but little nitrogenous matter which might act as a ferment, and it keeps consequently much better than beer prepared by top fermentation. In the latter case the yeast consists of gluten oxidized in a state of putrefaction and the bottom yeast is the gluten oxidized by slow combustion.

THE GLUCOSE QUESTION.

A good deal has been written about the deleterious nature of glucose and the evils resulting from its use in the brewing of beer, which examination shows to be much exaggerated. The brewer, it is claimed, requires malt, whether obtained from barley or other grains, mainly for the sugar or glucose it contains. The starch of the grain is converted into sugar, and the sugar in the process of fermentation into alcohol. Manifestly whether the brewer goes through the long process of malting the grain, in order to obtain therefrom the glucose, or utilizes glucose already prepared, the result is the same.

Still, however, we may dissent from the unreasonable position taken by many in regard to glucose and its properties, it will not be safe to

* Hassall: Food and its adulterations. London, 1886.

dispose of this question in a summary way, for, as Hassall very properly remarks:

"The extract of malt contains a variety of other substances, organic and mineral, beside sugar, so that the beverage produced from brewing malt extracts and the mixture of this with sugar and various other substances is very different in its actual composition and in its dietetic properties and effects."

The Massachusetts Board of Health, as quoted from the New York American Analyst, February 15, 1886, has some very sensible comments on this glucose question, calculated to dispose of popular fallacies regarding its supposed dangerous qualities. When properly and carefully manufactured, it regards it as a wholesome food, deficient however in sweetening power; but a dangerous article to be taken into the system when carelessly prepared. The question then turns upon its mode of preparation, Glucose is usually made from the starch of corn by boiling it with dilute sulphuric acid, a process first discovered by Professor Kircoff, a Russian chemist in 1811,* and largely practiced in Austria and Germany since that time; but only within a comparatively recent period introduced into this country. The process is thus described by the Massachusetts Board of Health:

"The starch is first obtained in a pure condition from the corn, then mixed with water, and the mixture is heated to boiling. Sulphuric acid is added to the extent of about two per cent, and it is then boiled about three hours. The starch is by this time converted to sugar and dextrine, both of which are in solution. The free acid is then got rid of by the addition of chalk or marble dust, which with the acid forms calcic sulphate, which settles to the bottom and leaves a clear supernatant fluid, which yields glucose and dextrine. Should all of the acid not be removed, or should the calcic sulphate be in any amount retained, it is evident that the product would not be entirely harmless, since disturbances of the digestion might follow its use. Moreover, the contaminations which are ordinarily present in commercial sulphuric acid will of course be present with the acid," and JOHNSTON claims that "such beer is deficient in the aromatic principle found in the skin of the grain."

It is hardly within the province of this Board in the absence of any law on the subject, to dictate to the brewers what they shall use in the making of beer, or declare that malt shall be made from barley alone when it is not yet settled that malt from other grains will not answer as well. It is however the duty of the Board to insist that no harmful constituents shall be used, leaving it to the brewers themselves to make their own selections from the whole range of wholesome substances.

It will be safe then for the State Board to recommend that the laws

* See Second Rep. State Board of Health of New York, page 596.

should state specifically that malt beverages should contain no other ingredients than the constituents of malt and with their derivatives as well as hops and pure water.

EXCESS OF BICARBONATE OF SODA.

The practice of charging the beer kegs with bicarbonate of soda, is one resorted to only when needless haste is made in turning out upon the market beer before the process of fermentation has been completed, and fermentable matter remains which is likely to sour. The bicarbonate of soda counteracts this tendency to acetification and gives the beer a good head; but beer that has lain from four to six months has in itself sufficient carbonic acid without resorting to this artificial charging, and the process of fermentation is so complete that there is left in it nothing likely to acetify. The practice, therefore, is simply an accusation of the beer to which it is added.

Dr. Bartley, of Brooklyn, speaks of the custom of brewers sending out to the market beers only fourteen days old, containing more or less yeast, and clarified by artificial means instead of in the natural way. He further shows that while bicarbonate of soda taken into the stomach in small quantities is quite harmless; yet in the frequent potations of habitual beer drinkers, who imbibe say thirty glasses per diem, an amount ranging from 180 to 200 grains of bicarbonate of soda, may be introduced into the system, with necessarily deleterious effect.

Another danger to be guarded against is at the retailers where it is alleged adulteration is carried on, either with the object of increasing the quantity, its intoxicating power, its pungency or to revive old beer and give it an artificial color, resulting, of course, in a deteriorated article. No matter how good the beer may be when brewed it is always liable to harmful manipulation in the hands of a conscienceless retailer. Water is added to increase the quantity with the result of lowering the proportion of its constituents and lessening its flavor. Tobacco or the seeds of cocculus indicus are added for intoxicating effect; color and flavor are given by means of burnt sugar, liquorice, treacle, quassia, coriander and carraway seeds. To increase the thirst of the consumer salt and cayenne pepper are put in, and various mixtures are concocted to get rid of stale ale. For these the brewers are certainly not responsible.

To maintain a proper surveillance over all the saloons of the State would be a work of great magnitude, and could only be effected by pressing into service the local boards of health of every town, village and city.

Importance of Pure Water.

The sanitary surroundings of breweries, and the purity of the water employed, are all of vital importance to the quality of the beer. In regard to the latter, it has been remarked that

"It is well known that the quality of the water used has a great effect on beer, on the extraction of the soluble constituents of the malt, and on the subsequent clarification of the fermented beverage.

For the first purpose a soft or even an alkaline water would appear to be the most suitable; but, for the second, there is no doubt that waters containing much lime are the best. The lime combines with the phosphoric acid of the malt and forms an insoluble salt, which assists in carrying down any suspended matter.

In the course of boiling, the excess of carbonic acid in the water, by which the carbonates of lime and magnesia are dissolved, is expelled, and these salts are precipitated; again, the alkaline phosphates present in malt have the power of decomposing and precipitating sulphate of lime, phosphate of lime and a soluble alkaline sulphate being formed, but part of the phosphate of lime so formed is re-dissolved in the acid generated during fermentation. The water from being at first hard, thus becomes comparatively soft, and in this state is well suited for the extraction of the active properties of the malt and hops."

In regard to the water used by the breweries of our own State, of course, that depends upon the local supply for potable purposes. The subject of the purity of potable water-supplies has become of so much interest to the citizens and has led to such earnest efforts to secure this end, that the quality of the beer may be expected to partake of the improvements made in this direction.

Sanitary Condition of Breweries.

A few selections from the notes of our inspector in regard to the sanitary condition of the breweries visited may serve as an example of their general condition.

One brewery in was an old place in bad repair, and so foul and unclean that it would seem as though any thing manufactured in such a place must be unfit for drink.

Brewery in was small, dirty and loosely conducted.

At is a medium sized ill-kept place, and, from various signs, should judge the beer to be bad. Owner's reputation is bad and retailers refuse to handle his beer quite frequently.

At , medium sized brewery, not very clean. The cellars were quite sour.

Another at was of medium size and clean up stairs, but the cellars were foul, dirty and utterly unfit for use.

Another at same place was only fairly kept and their beer was apparently very bad.

At was a small dirty brewery, the kettle for boiling the beer and a stable full of foul smells occupying a cellar together.

At was a fairly clean, medium sized brewery. The cellars were particularly sweet for an ale brewery.

Another at was old and undergoing repairs and consequently dirty, but I judged, that at best, it is slovenly kept.

Another place was middle sized, carelessly run and not over clean.

At is a very large establishment consisting of two breweries divided by a canal. They are connected by a passageway built in the arch of the creek which runs under the canal and into which most of the sewage of....runs. The odors from this creek permeate the cellars adjacent to the passageway. The rest of the breweries are very well kept, sweet and clean. A malt-house is connected with the breweries in which all the barley used is malted. Well-water is used in making the beer.

Another brewery at was a good sized place and well-kept, except that the cellars were very wet, the result of an overflow, the drain having been stopped up during the heavy storm of Saturday morning.

Another brewery out of the city of , uses water from a large spring. The buildings are all new, and, as at another brewery, an ice machine is used which is much cleaner than ice.

Another brewery in was a little, dilapidated, dirty place.

Outside of is a brewery which is an old place and dirty.

In was a small place, clean and very dry.

A brewery at was small, old and dirty. A new part is nearly finished and will soon be occupied, when the old place will be torn down. Its cellars are blasted out of solid rock which comes to within two feet of the surface.

Another brewery, at same place, is a large concern, well managed and fairly clean. Their cellars are in the rock and go down forty-four feet and are well drained, all the dripping of water and beer running into two tubs sunk below the lowest cellar floor, from whence it is pumped up and allowed to run into the sewer. A like system is needed in all the breweries having rock cellars, but this is the only one in which I have found it.

Next brewery visited was medium sized and not very clean. Most of their cellars are in the rock.

Another was a very small place, rather dirty, with poor cellars.

At the largest brewery in , the buildings, machinery, etc., are

new and very fine, well-kept and clean. The cellars are in the rock, and are carefully washed and drained.

A brewery was found to be fairly clean up stairs but the cellars were foul and dirty.

Another well-kept brewery has its cellars in the rock and they are well-washed and drained.

The next was of medium size, dirty, with sour smelling cellars.

At , is a brewery, fairly well kept, although the lower parts are very wet.

At , is a medium-sized place, not clean, not well-managed and part in poor repair.

At , a medium-sized place, using water pumped directly from river. It was clean and fairly kept.

At , is a large, very well-kept brewery. It is very clean and and carefully drained.

At , a medium-sized brewery, fairly clean, with well-drained cellars. Spring water is used in the beer.

Another brewer, at same place, secures the water for his beer from a well and a spring.

At , was a very small, dirty place at which water from a well is used in the beer.

At , visited an old established place where spring water, brought from out of town, is used. They claim to make their beer just as good as when the brewery first started, that is from malt and hops alone. They complained bitterly of the ruinous competition of brewers who use cheap articles.

A number of other breweries visited were described as having foul, wet and filthy cellars, while those connected with other breweries were sweet and clean.

RECOMMENDATIONS.

First. The law should be amended so as to define the normal constituents of malt beers or malt beverages.

Second. That a malt beverage should, as its name indicates, contain only malt and hops, with their constituents, and water.

Third. That Congress should pass a law making it obligatory upon the Internal Revenue Department, at all times, to permit publicity to be given to the ingredients reported to it by the brewers and distillers as having been purchased from which to brew or distil.

Fourth. That the local boards of health, throughout the State, should have a special surveillance over the sanitary condition of the

breweries within their jurisdiction, and should, through their health officers, make periodical visits and report upon the condition of these establishments.

Fifth. That no other than pure water should be used in the brewing of beer.

Sixth. That the local boards of health, throughout the State, should have a special surveillance over the saloons located in their jurisdiction, and should, from time to time, have samples purchased of the beverages sold and forward them to an analyst for examination; and that some arrangement should be made whereby the expense of these analyses be defrayed by the board of excise.

Seventh. That no condition of secrecy should be imposed in the law relating to beers, spirituous or malt liquors, but that it should be admissible on the finding of any adulterants or harmful ingredients in any sample examined, to have the fact made public as the best means of correcting the pernicious practice.

FREDERICK CARMAN,
Assistant Secretary.

At a meeting of the State Board of Health, at New York, on the 3d of March, 1886, the Chairman of the Executive Committee presented with his approval the above report, and, on motion, its recommendations were adopted, the report ordered printed and laid before the Legislature.

FREDERICK C. CURTIS, M. D.,
Acting Secretary.

Syracuse, *February* 26, 1886.

To the State Board of Health of the State of New York:

Gentlemen — I have the honor to submit, herewith, the following report of my examination of the samples of beer sent to me per express, by your Secretary.

Most respectfully,

FRANCIS E. ENGELHARDT, Ph. D.,
Analyst.

Having in a previous report to your honorable Board (contained in the second annual report of the State Board of Health, Albany, 1882, on page 667 to page 687) given the definition, constituents, methods of brewing and analysis of beers, together with some remarks on adulterations and an exhaustive report on the literature of malt liquors, I shall confine myself to-day to the results found in my late investigation of the beers manufactured in the State of New York, adding such recommendations and remarks as I deem most proper to the subject under consideration.

The number of samples of beer examined up to date are 476. Among them were samples of porter, ale, lager beer, present use beer and weiss beer.

The results of the analyses of these samples of beer, which I forwarded from time to time to the Secretary's office in Albany, and which have been very kindly tabulated by the Assistant Secretary of your honorable Board, show by comparison remarkable differences both in composition and physical characters.

Thus, the specific gravities of the various samples of beer vary from 999.44, found in sample 248, to 1037.00 of sample 289.

The specific gravities of the samples of beer after removal of alcohol (by evaporating 100 cubic centimeters or grammes of beer, to about one-third, and then replacing the loss thus sustained exactly by distilled water, to 100 cubic centimeters or grammes), varied from 1001.83, found in number 426, to 1033.63, in number 207.

The variations in alcoholic strength are not less remarkable. The lowest amount of alcohol was contained in sample 132, namely, 0.677 per cent by weight, and the highest in sample 32, namely, 8.994 per cent by weight.

The quantity of extract varied from 1.277 per cent, in sample 426, to 10.058 per cent, in sample 207.

The ash of the beers was lowest in sample 155, namely, 0.069 per cent, and highest in sample 403, namely, 0.4676 per cent. Apparently, number 191 has the most ash, namely, 0.557 per cent, which includes 0.0992 per cent of salt; if we deduct the latter from 0.557 per cent, only 0.4578 of pure ash remain.

The addition of salt to beer is unquestionably practiced in this State to a great extent by porter, ale and weiss beer brewers, but much less by lager beer brewers. It is added by some to give taste

to the beer, as they express it; by others to clarify the beer, since by the addition of salt to beer, rich in carbonic acid-gas, the latter is partly liberated, and while ascending in the beer, carries along to the surface the mechanically suspended matter in the beer, and which then may be removed by skimming. If I am properly informed, the English law allows the addition of fifty grains of salt per gallon of beer, or about 0.086 per cent. Of the samples examined for salt 23 contained over 0.10 per cent; and in sample 76, no less than 0.338 per cent were found.

That salt creates thirst is well known, and hence we may conclude that it is often added for this purpose. (Some samples of beer were found entirely free of salt — respective chlorine.)

A sample of beer, when having not received an addition of salt by the brewer, should contain no more than ten grains per gallon, and which may be due to the water employed, since only very rarely waters are entirely free of chlorine respective salt. If a water used for malting, brewing, etc., contains more chlorine than the equivalent of ten grains of salt, it is in my opinion unfit for these purposes (except waters in salt regions, etc.) since the excess above ten grains per gallon is almost in every case due to drainage from a neighboring privy, cess-pool, broken sewer, etc., into this water. In the first samples of beer analyzed, the salt (chlorine) was not determined; first when the ash in many samples found was much larger than could be expected by a comparison with the other ingredients of the beer. I determined the chlorine and calculated from the results of the former the corresponding amount of the latter. I found, moreover, that when deducting the salt from the total ash, the latter was in many cases about three times greater than the phosphoric acid found.

Although salt is not injurious in the quantities usually added to beer (0.10 per cent salt equal to about fifty-eight grains per gallon of beer) there should be a proper limit, if the addition of salt is allowed.

The phosphoric acid is a very important ingredient in good beer. It should amount to about one-third of the pure ash of the beer. In my examination I found it lowest in sample 442 (a "weiss beer") namely, 0.0264 per cent, and highest in number 403, namely, 0.1661 per cent.

Beers with a high percentage of alcohol and extract and a low percentage of phosphoric acid may be considered, as beers made with substitute for malt, especially glucose and grape sugar. The addition of the latter two to beer wort (taking the place of a certain amount of barley malt in the manufacture of beer) are not objectionable if properly prepared on the ground of being injurious to health, but on the ground that by substituting them for malt, the normal constituents of a good malt beer are changed to the *detriment* of the consumer, since they neither contain albuminoids nor phosphates, both of which must be considered very important foods in the beer.

In my former report, on page 678, I said:

"To give to beers, especially those that have been made by *substituting* a portion of barley malt by grape sugar, glucose, starch, potatoes at the required viscosity (vollmündig keit) and the *ash constituents* (albuminoids and phosphates) wheat bran and phosphates of the alkaloid are recommended." Some of the samples of beer submitted to examination seem to have received some of the latter treatment.

The employment of corn, rice, wheat and oats as substitutes of barley malt do not deprive the resultant beer of phosphoric acid and albuminoids in the proportion that grape sugar and glucose do, but nevertheless they are an imposition on the beer-drinking public and should not be allowed.

On page 667 of my report of malt liquors of 1882, I said:

"Under the name 'beers' in the widest acceptation of the word, are included beverages which are produced by vinous fermentation and which usually are still in a state of slow after-fermentation. They differ from distilled liquors, especially in their larger amount of solid matter remaining after the removal of water and alcohol (volatile acids). This residue consists of sugar, dextrine, albuminoids, phosphoric acid, potash," etc.

"If we accept this definition of 'beers' it follows that they may be made from any saccharine or starch-containing material; thus opening the door for the unscrupulous manufacturer to use all kinds of adulterations, substitutes, etc. Hence it is *absolutely* necessary to define 'beers' as the Bavarian government has done, namely, as wine-like liquids, yet in a state of after-fermentation prepared *only of barley, malt, hops, yeast and water.* To this might be added the lowest amount of malt and hops to be employed by the brewers in the manufacture of one barrel of beer of thirty-two gallons, and also the age the beer should have attained before it reaches the consumer."

"All similar beverages produced by the use or substitution of various materials for malt and hops must be sold under the name indicating the substitutes employed, as 'rice beer,' 'wheat beer,' 'corn beer,' 'grape sugar beer,' 'glucose beer,' etc. Thus all fraud would be prevented, a more uniform product obtained and a wholesome beverage insured."

The number of beers free of sulphates were 64, or about 13.5 per cent of the samples examined. Since many beers are brewed with water containing sulphates (especially sulphate of lime) their presence is but natural; an excess in many cases may be due to the addition of gypsum, but also, to some extent, to the use of grape sugar and glucose, since both of them often contain some sulphate of lime or gypsum. (My investigation of a number of glucose and grape sugar samples in this direction has not been far enough advanced to give proper figures now.) The use of bisulphite of lime as a preservative added to beer may also increase the sulphates.

To find the strength or percentage of saccharine matter in the

beers (before it is submitted to fermentation) called "wort" we multiply the alcohol found in the beer by two (sufficiently accurate for all practical purposes), and add to the resultant product the amount of extract found in the same beer.

Beers with a saccharometer strength of the wort above 20 per cent were nine in number, namely:

Number.	Alcohol.	Extract.	Wort.
403	6.756	8.651	22.363
416	7.061	6.091	20.213
425	7.304	8.527	23.135
32	8.994	7.929	25.917
35	7.444	6.929	21.817
370	7.679	5.829	21.187
389	8.193	5.894	22.280
160	8.333	6.738	23.404
61	7.537	5.699	20.773

The lowest in saccharometer percentage was sample 31, namely, 3.235 (a kind of weiss beer). Beers like the above are usually made for export trade.

Of beers lighter in alcohol and heaviest in extract there are also several samples; No. 289 has of alcohol .9625 per cent by weight and 9.547 of extract; original wort, 11.472 per cent. Sample 132 contained .677 of alcohol in per cent by weight and 4.152 of extract, original wort, 5.422. (Liquids of this kind — I mean the latter one — should not be classified under the beers.)

Unfit to be drank either of being too sour, having a musty taste, or being too roily, ten numbers have to be recorded. A number of samples of beer (so called) sent to me for examination contained less than 6 per cent of saccharometer in their wort. Their number was 18; while 17 samples contained between 6 and 10 per cent.

A good beer, in my opinion, should be made of a wort of at least 11 to 12 per cent of saccharometer.

In regard to the physical characters of the beers under consideration, I found that 113 samples, or 23.79 per cent, could be considered perfect, 127 samples, or 26.50 per cent, almost perfect, and 219 samples had to be considered inferior, or about 46 per cent of the entire number examined. Slightly sour I found 81 samples; decidedly sour 58 samples.

Since a considerable number of the beer samples were collected during the warm weather, hence were exposed to its influence, some allowance should be made in considering the above results.

A considerable number of beer samples were young beers — perhaps, in most instances, not over fourteen days old. At the bottom of these samples (contained in champagne bottles) were heavy sediments of yeast. The brewer, when the first fermentation (the main one) is finished in the fermenting tubs, clarifies, though often in an insufficient manner, the beer by artificial means, and fills it in the

casks intended for the retail trade. To give to the beer a certain amount of carbonic acid, above that which is remaining naturally in the beer, he adds a piece of compressed bicarbonate of soda (from one to two ounces, or more, according to the capacity of the cask); and if the beer contains an insufficient amount of lactic acid, etc., some tartaric acid, cream tartar, etc., is added. Thus this brewer is enabled to turn his capital over at least twelve times a year, while the honest brewer, who allows his beer to attain an age of from eight to twelve weeks, can do it only four times, or five times. But, apart from the money consideration, beer made in the manner just described, and sent to the consumer when only two weeks old, injures the latter's constitution, not only by the presence of soda in the beer, but also by the presence of the yeast, since, according to investigations made under the supervision of Professor Von Pettenkofer, beer roily from yeast cells, though respective small quantities of such beer are taken, it acts on the digestive organs in such a manner as to produce catarrh of the stomach and intestines; hence the city ordinances of many Bavarian cities contain laws prohibiting the sale of beer roily from yeast cells, or decidedly sour, under heavy penalties. ("Repertorium der Analytischen Chemie," No. 21, November, 1885.)

In none of the 477 samples of beer submitted to me by a careful investigation for hop substitutes, any of the latter could be proved to be present with certainty.

In regard to substitutes for malt, I have marked each sample in regard to the results found.

In conclusion I would recommend: First — to define beer (*to be made of barley, malt, hops, yeast and water only*) — that beer, made by substituting wheat, corn, rice, grape sugar, etc., for a portion of barley malt, must be called according to the substitutes, rice beer, wheat beer, etc.

Secondly — No lager beer to be sent in the market, that shows on examination to have been made from a wort of less than 11 to 12 per cent saccharometer.

Thirdly — That no lager beer be sent to the consumer less than eight to twelve weeks old, and properly clarified, before sending, so that it be free of yeast cells, as far as this can be accomplished.

Fourthly — That no bicarbonate of soda be added to the beer sent to consumers to give it the artifical carbonic acid gas, nor glycerine to increase its viscosity.

Fifthly — That no substitutes for hops are permitted, though they be harmless.

REGISTRATION AND VITAL STATISTICS.

REPORT

OF THE STANDING COMMITTEE ON REGISTRATION AND VITAL STATISTICS.

With the exception of the cities of New York, Brooklyn, Yonkers, Buffalo and Albany, all local health organizations throughout the State are required to send the records of births, deaths and marriages to the central office of the State Board of Health for registration. The Board is, therefore, relieved of the sanitary oversight, and the registration of the vital statistics records of 2,381,000 of the population of the State gathered in these large centers, and has charge of this work for the remaining 3,000,000 inhabitants scattered over its extensive area. The work of the Board, so far as its committee on registration and vital statistics is concerned, is to direct and secure the collection and registration of certificates, properly filled out, of all births, deaths and marriages, and, as essential to this, the organization of local boards of health in the towns, villages and cities in whose respective precincts they occur. After registry in the local office they are all registered together in the central office of the State Board.

Changes in the laws.— Difficulty has always been met with in enforcing the statutory requirements upon some individuals in the community to make these returns. Prior to the act passed by the last Legislature [an act for the preservation of the public health and the registration of vital statistics, chapter 270; passed May 12, 1885] physicians and midwives were required to make returns of births of which they had charge, and the returns of marriages were required of the officiating clergymen or magistrates. The lack of adequate authority and suitable methods has been felt. It is now made the duty of the parents or custodians of every child, within a specified time after its birth, to return the record of the same, duly attested by the physician or midwife, if any, in attendance; and every marriage is to be reported by the groom, with the attestation of the clergyman or magistrate performing the ceremony, or directly by the clergyman or magistrate. Many of these returns are still made, from long-continued habit, by the physicians and clergymen, and it is to be hoped that this will continue, thus materially facilitating the completeness of these returns. But the question can no longer arise as to the constitutionality of the obligation resting where it now does, and the enforcement of the law is entirely feasible, although time will be required to educate the people and the local boards of health to its complete observance. The returns of deaths, the obligation of which rests upon the undertakers or persons having charge of the dead, is likewise feasible of enforce

ment. While it has been the experience everywhere, even in the older countries where the work of registration of vital statistics has been for a long time carried on, that it is very difficult to secure absolutely complete returns, still constant effort effects more and more perfection, and the beneficial influence upon it of the law of 1885, especially in the returns of marriages, has been felt during the year in the greater completeness of these returns.

The policy of the system of health organizations has been, since the State Board of Health was organized, to make the registration complete through the agency of the local boards of health exclusively. Although a copy of the law has been sent to every local board, still considerable correspondence has been required to explain that no dependence remains upon the means which county boards of supervisors had been empowered to use, under the Laws of 1847 and 1880 (chapter 154 of 1847, and 512 of 1880). These laws are all repealed by that of 1885 (chapter 270), and the system of registry, sanitary work and all the machinery of health organization is limited entirely to the State Board and the local boards of towns, villages and cities. The text of this law is appended to this report.

A set of model sanitary ordinances, based upon this law, has been prepared by the late secretary and offered to local boards for their guidance in preparing their local ordinances. The legality of their requirements is established, as they have been approved by the Attorney-General. It is No. 53 of this Board, and a copy may be found after the law as part of this report.

The work of registration has been placed in a satisfactory shape during the year. The early years of the Board were devoted to the primary work of organization, almost to the exclusion of this duty. There in consequence accumulated many thousands of certificates, far beyond the capacity of the regular clerical force in the office to register. In May, 1884, the registration was nearly two years in arrears, less than 50,000 certificates having been put into the books. By resolution of the Board additional clerks were employed, to whom this back work was committed, the regular clerks being put forward to the current registry. During the year this work has been completed, and, besides, index volumes nearly to the present time have been prepared. About 225,000 certificates are on the registers in the office, and the work is now kept within a few months of the current date. By means of the indexes and the chronological system of registration these entries of certificates are readily accessible, and not infrequent requests come to the office from all parts of the country and abroad for certified copies of the records. The registration is now being kept up by the regular clerks in the office.

Estimating the receipts of certificates of births, deaths and marriages at this office by the number received in four recent months, in which 30,569 were received, there will come to the office during the course of the year not far from 100,000 certificates. Some of these, however, are delayed returns.

A slight change has been made in the form of the blank certificates.

Heretofore the name of the county and of the town has been printed upon the form; this has involved delay in filling orders, was the cause of additional expense to the local boards, and was considered unnecessary, at least for the smaller towns.

The Board has adopted a form for recording still-births, prepared by the late secretary, Dr. Alfred L. Carroll. Heretofore there was no provision for the registry of these, and the blank forms upon which they were written were merely preserved without being recorded. A sheet has been sent to each registering officer upon which to enter these, preserving this register in his office, and he is directed, in sending his monthly returns here, to note the number of them, the certificates being retained in his office. As to the certificate of a still-birth, it should be considered as itself a certificate of death, calling for the issue of a burial permit.

To facilitate the work of the office, as well as to give regularity to that of the local boards, a circular has been issued directing local registering officers to send, at one time, by the 15th of every month, all the returns of births, marriages and deaths for the calendar month preceding.

Legibility is an important element of a certificate, and the lack of it in certificates which have passed the supervision of local health boards and reached this office is not infrequently encountered. It is particularly important on death returns, where the scrutiny which the law requires of the health officer over these certificates cannot be too thorough. Exactness in filling out answers to all questions on the blanks, and plain writing of the signatures should be required. The necessity of it is frequently found in the requests for transcripts of the records in this office. An urgent request for information as to the time of death of an individual has recently been received where it is difficult to determine whether it was "A." M. or "P." M.

The decision that local health officers are State officers and, therefore, necessarily coming under the requirements of the civil service examination whenever newly appointed, will effect two desirable improvements, a higher degree of competence and a greater stability in service. The latter point will operate to secure improvement in the supervision of the death certificates. At the request of the Civil Service Commission a circular has been sent to all local boards calling their attention to the requirements, without which appointments of health officers will not be valid; the board can either name one physician for a non-competitive examination or two or more for competitive examination. Three grades of questions, for towns, villages and cities, respectively, have been prepared by the board of examiners, and a written examination upon them is held by the county judges of the respective counties.

How far the local registry of large public institutions should be carried, swelling the mortality record of the locality beyond a legitimate degree, is an unsettled question. In large cities this is partly compensated for by the constant influx of young healthy adults from

the country. But in small rural villages the mortality rate of large infant and insane asylums, prisons and alms-houses materially affects the death rate as compared with the accredited population. In these latter it would appear equitable that in all printed reports of mortality, presenting the comparative healthfulness of localities, the deaths of public institutions should be separated from those of the population of the place. For large cities, although this may be a question, it would seem that they might with propriety be accredited to the locality for the reason given. In all cases it would be best that the returns should come through the local board, at whose office they should first be registered to effect a uniform observance of the law. In regard to unknown dead, brought by accident, as by the tides or river currents, to a locality, the few that cannot be traced as they should be to their legitimate place will not materially affect the local mortality rate. Some solution of this whole question of the proper accrediting of mortality, in so far as it affects a study of the movements of disease and vital statistics, awaits yet a satisfactory solution.

There are twenty cities required by law to make returns to the Bureau of Vital Statistics, 347 villages and 944 towns, making 1311 potential local boards of health. Of the cities, all have organized boards and make regular returns. About one-third of the 347 incorporated villages in the State have local health organizations; part of these make their returns through their town boards, however, being organized only for sanitary purposes. All incorporated villages are required to maintain health boards, unless the consent of the State Board is obtained to the contrary. Provision exists, as will be found at section 7 of the law of 1885, whereby combined sanitary and registration districts may be formed. Many of the villages have but a few hundred inhabitants and are so much a part of the town that a separate organization is not desirable. There are about seventy-five villages having a population of 3,000 and over, and it would in many ways simplify the work if these alone were required to comply with the law in regard to establishing boards of health, except in cases where other conditions than size made it advisable.

Of the towns, about 700 have organized boards of health, most of which make more or less regular returns of vital statistics. A considerable number of these have been organized within the year. The 250 yet unorganized town boards are for the most part in the more retired rural localities. Prior to 1880 no system of town health organizations was thought of, and this, together with the lack of a local exigency to stimulate the specified officials to activity, yet operates to delay what is desired in this direction. Efforts are being constantly made to secure the organization of all boards. There can be no question but that the principle upon which the health work of the State is based, of having the local work done by local authority, under the advice and assistance of a central board, which is especially desirable to them because of their frequent change in

personnel, and their to-be-anticipated inexpertness in sanitary affairs supplemented by the resources of the State Board is the best that can be devised and will be more and more productive, as it secures fuller operation, of the best results. By means of two sets of books kept in the office, record is kept of the local boards organized, together with their *personnel*, and also the regularity and number of their returns of vital statistics. A more perfect form for these books has been adopted during the year.

A Monthly Bulletin of Mortality was begun in April, 1884, and the issue of this has been continued through the year. This has proven of value in a two-fold way; regular information is obtained in its preparation of the activity of each reporting board and also a gauge of the healthfulness of all localities of the State, especially of the prevalence of preventable diseases, is secured. The publication distributes this information to the boards and to all interested, and contributes very much to keeping the people alert against all kinds of insanitary conditions that injuriously affect the public health. It has brought to light the laxity of collecting returns, and this has been rectified in several instances by this board, notably in the cases of Troy and Cohoes. Authority is given to this board to assume the registry of a locality if unsatisfactorily done by the local board. The committee on vital statistics are of the opinion that the good work of the board is very materially aided by the Monthly Bulletin.

In commencing the publication, the question as to how to represent all localities of the State, without specifying the mortality of every one of the reporting local boards in each issue, which was manifestly impossible even if desirable, was met by dividing the State into eight *sanitary districts*, which possessed some geographical and topographical individuality. This division had already been made for another purpose and with some amendment it was followed.

The Maritime district includes those counties bordering on tide-water, and the large commercial center of the State. It has a population, according to the census of 1880, of 2,098,580, the great proportion of which is urban. The *Hudson Valley district* includes the counties on either side of the river above Westchester, including Albany and Rensselaer; its population being 750,143, and in the seven cities in the district there being an estimated population of 247,000, or nearly one-third of the entire number. Topographically, it is uniformly hilly, and is generally well drained. The *Adirondack and Northern district* has a population of 330,434, and a very extensive area, including all the northern part of the State between the Vermont border, the St. Lawrence river and Lake Ontario. In it is the Adirondack region, justly famed as a health resort, and it also contains large regions of flat and often marshy territory, which is far from salubrious, containing a multitude of small lakes, rivulets and inlets from the large water bodies surrounding it. Much of it is but thinly settled, and there are but two cities in it, aggregating about 22,000 population. The

Mohawk Valley district lies along the course of the Mohawk river, including Oneida county, and has a population of 280,809, of which 80,000 is in the four cities of Schenectady, Amsterdam, Utica and Rome, with a considerable number of large villages. It is less hilly than the Hudson Valley district, and besides containing much of the most fertile land in the State has also a considerable manufacturing population. The *Southern Tier district* takes in the counties, seven in number, along our southern border. Its population is 365,746, and in its two cities of Binghamton and Elmira there are 45,000 inhabitants; besides it has numerous large villages. It is largely upland country and well drained. The *East Central* and *West Central districts* together include the central counties of the State, the division being somewhat arbitrary. The region is chiefly agricultural and for the most part rolling and some of it hilly, including, however, the territory of the small lakes, and some of its area being swampy and malarious. The population of the East Central district is 354,320, with the city of Syracuse of 65,000 inhabitants; of the West Central, 321,247, with the city of Auburn of 26,000 inhabitants. The *Lake Ontario and Western district* has a population of 578,505, and the four important cities of Buffalo, Rochester, Lockport and Oswego with 340,000 inhabitants, taking in the counties along the southern coast of Lake Ontario, and also Erie county. While its population is so largely urban, this is lessened in its bearing, as Buffalo, with 200,000, is not reported in the Bulletin. Reports from all the other twenty-four cities of the State are included.

In the Maritime district there are 47 towns, of which 9 have not organized boards of health.

In the Hudson Valley district there are 126 towns, of which 17 have not organized boards of health.

In the Adirondack and Northern district there are 138 towns, of which 45 have not organized boards of health.

In the Mohawk Valley district there are 136 towns, of which 33 have not organized boards of health.

In the Southern Tier district there are 141 towns, of which 74 have not organized boards of health.

In the East Central district there are 128 towns, of which 31 have not organized boards of health.

In the West Central district there are 122 towns, of which 27 have not organized boards of health.

In the Lake Ontario and Western district there are 105 towns, of which 19 have not organized boards of health.

This summary gives some idea of the relative conditions of these various divisions of the State and their relative degree of organization. It will appear that in the Adirondack and Northern district there are many towns unorganized, for the most part on account of the sparseness of their population and their remoteness from centers of travel, and that in the Southern Tier district the same is true, half of the towns yet having no boards of health, part of them for

the same reason. About half of the towns having no organized health boards lie in these two districts. These considerations are to be taken into account in studying the Bulletins for the months of the year, which with a summary of the year's mortality are appended to this report.

During the year there were reported in the bulletin of mortality 80,407 deaths. Besides, there were received about 3,000 reports of deaths too late to appear in the bulletin. The mortality of one of the largest cities in the State — Buffalo — has not been included, and estimating its annual mortality at 4,000, we have about 88,000 deaths accounted for. Estimating the present population of the State at 5,400,000, an annual death-rate of twenty per 1,000 would give a total mortality of 108,000, at which estimate the returns accounted for would fall short 20,000. Although the death-rate of the large cities materially exceeds twenty per 1,000 annually, it may be considered that for the entire population, both rural and urban, this is above the average. A death-rate of eighteen per 1,000 annually for the estimated population of 5,400,000 would give 97,200 deaths. It may perhaps be fairly said that the number of deaths occurring in the entire State is nearer this estimate, and is not above 100,000 annually, and doubtless ninety per cent of the actual mortality is secured. The actual death-rate cannot be given on account of the irregularity with which many of the smaller places have made their returns.

Although it would appear that the deaths accounted for fall short of the probable actual death-rate about ten per cent, it should be noted that during the year about 5,000 more deaths were reported than in 1884. This was not due to a higher rate of mortality but to greater completness of returns and increase in the number of local boards of health organized.

The 10,000 deaths that are not accounted for fail of record partly from the lack of complete organization of all local boards throughout the State and partly from incompleteness in the returns of some that are organized. Reference to the bulletins will show that the death-rate per 1,000 of many localities is habitually so low as to make it evident that their returns are incomplete. Of all the returns of vital statistics, the death returns are most feasible of collection, and although it is the universal experience that absolute completeness is not met with, yet with our explicit laws it requires only sufficient energy on the part of the local officers to secure them very fully in this State. The efforts of this board in several marked instances have been followed by great improvement. As to the shortage due to non-organization of local town boards of health, the number and locality of which towns have already been referred to, it may be said that there is pretty steady improvement in this respect, and the efforts of the board are being constantly exerted in this direction. The organization and perfection of such work requires time and established habit, and is interfered with by the annual change in the local elective officers who are made the components of local boards.

But more could not be expected than has been accomplished during the short existence of the present system of sanitary management established in this State. The system fails in that it requires so large dependence upon local workers, but is admirable to a more then compensating degree in placing the administrative and executive work of protecting the public upon the towns directly under the advisory supervision of the central board, and experience abundantly shows that as one of its points of advantage, the work of registry and collection of vital statistics is important in keeping up the local organization and work, and its perfectness answers as a barometer of the general activity of the local board.

The *sanitary condition of the State* is exhibited by the monthly bulletins and the summary of them which has been given. Of the entire reported mortality about one-third was of children under five years of age. This was highest during the summer months, from diarrhœal disease, especially in July, when more than half the deaths occurred under this age.

For the entire State the ratio per 1,000 of deaths from zymotic diseases to the total mortality is 222.17. It was highest in the summer months and September. The zymotic death-rate was considerably higher in the Maritime district than in other parts of the State, and next to that is the Hudson Valley district, showing the relative preponderance of deaths from these causes in the urban over the rural population. This measure of healthfulness compared with the year preceding shows that the proportion of the preventable diseases to the total mortality is as 222.17 to 269.12, which was the zymotic death-rate for nine months of 1884. This diminution appears to have been, as the secretary shows in his report, largely in typhoid and diarrhœal diseases. In 1885 the conjoined ratio of deaths from these diseases per 1,000 total mortality was 104.07 against 146.40 in 1884. As these are the special filth diseases that are controliable by public hygienic improvements, it may be inferred that the result is at least in part the fruit of what has been done by organized sanitary work. As the secretary further indicates, this received additional emphasis from the fact that diphtheria which is more often to be traced to insanitary conditions of domiciles and premises instead of those of a more public nature and influence, was increased in the proportion of 56.06 deaths per 1,000 total deaths in 1885 to 47.65 per 1,000 in 1884.

During the early months of the year there was a very considerable and general prevalence of measles. Epidemics occurred from it in all parts of the State. Corresponding with it in time was the development of scarlet fever to a greater extent than later in the year, not, however, to an unusual degree.

Typhus fever fortunately appeared nowhere in the State in 1885, outside of the large cities that are beyond the jurisdiction of the board. It has existed in New York and Brooklyn to a moderate degree through the year, the total number of deaths from it being eighteen. In December it made its appearance in Albany, in the

county penitentiary, and seven deaths occurred. Efforts are being made to trace its origin, and there is good reason to believe that its duration as an epidemic there will be short and unattended with spread of the disease outside of the institution. Small-pox has fallen more lightly upon the State than was with good reason anticipated in view of its alarming development in the neighboring city of Montreal. Repeated notices of warning and information was sent to all border towns and along all lines of railroad leading from Canada. Instructions were given as to embargo, quarantine and the protection of vaccination, all of which, with the train inspections afforded by the national government and the assistance of a healthy rousing of the popular mind, has doubtless secured our immunity. Vaccination has never been so general and never so satisfactorily done nor with so uniformly good vaccine virus. In some reports from town boards it appears that every individual has been offered vaccination. It is gratifying to the committee to note the readiness of the people generally to submit to this, as they are convinced that if it were universal its protection would be so complete that not another death from this disease would appear upon the bulletin of mortality of the State. It should be of all the preventable diseases the least to be feared because it is the only one that is absolutely preventable.

From consumption the ratio of mortality is quite uniform, presenting no marked variation either as to locality or as to time. The proportion of deaths to the total mortality was largest in the winter and spring months. The death ratio was smallest in the Southern Tier district and highest in the West Central district, there being in the latter about 155 deaths to the 1,000 total mortality. The next highest ratio is found in the Adirondack and Northern district. There may be a significance in this, pointing to the dependence of this disease often on a high level of ground water. In the last-mentioned district there is to be sure a favorite and for many cases desirable health resort for those afflicted with this disease, but in its large area is much flat soil-saturated territory. The same is true of some parts of the West Central district. No general sanitary improvement will do more to lessen this disease, which uniformly causes about fourteen per cent of the total mortality, and which has much that allies it with the preventable diseases, than the one which will secure drainage of the soil upon which habitations are constructed.

During the first five months of the year there was a remarkable prevalence of acute respiratory disease. Pneumonia especially caused a large mortality.

Of other causes of death, little needs to be said, as far as the precautions for prevention of disease by the machinery of health boards is concerned. The frequency of those which are more interesting to study, as well as their distribution, may be learned by reference to the monthly bulletins and the annual summary. This publication, while a constant source of information to the central office as to the conditions and tendencies of all localities of the State regarding their sani-

tary condition, also is of informing and inspiring value to the local boards as to their real and comparative healthfulness and at the same time an accumulation of data of value to the statistician and the student of sanitary science.

G. W. COOKE, M. D.,
Chairman.

AN ACT

For the preservation of the public health, and the registration of vital statistics.

Chapter 270. Passed May 12, 1885; three-fifths being present.]

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. It shall be the duty of the common council, upon the nomination of the mayor of every city in this State, except in the cities of New York, Buffalo, Albany and Yonkers and Brooklyn, which are hereby excepted from the operation of this act, to appoint a board of health for such city, to consist of six persons who are not members of said council (one of whom, at least, shall be a competent physician), who shall be nominated and appointed as follows: two persons for a term of one year; two persons for a term of two years; and two persons for a term of three years. The mayor of such city shall be a member *ex-officio* of such board of health, and shall be president thereof. The said board of health, when duly organized, shall appoint a competent physician (not a member of such board), who shall be health officer for such city. Upon the expiration of the term of office of any member of the board of health, appointed as herein provided, his successor shall be nominated and appointed in like manner for the term of three years; and the said mayor and common council shall also have power to fill any vacancy caused in such board of health by the death, resignation or removal from the city of any member thereof. And it shall be the duty of the trustees of every incorporated village in this State to appoint, once in each year, a board of health of such village, to consist of not less than three nor more than seven persons (who are not village trustees), who shall hold office for one year, or until their successors shall have been appointed. The said board of health thus constituted shall elect a president, and appoint a competent physician (not a member of such board) to be the health officer of such village. This section shall not be construed to remove any of the existing boards of health in any of the cities or villages of this State, but the successors of such boards shall be appointed as in this section provided.

Constitution of City Boards of Health.

Health Boards of villages.

§ 2. It shall be the duty of the supervisor, the justices of the peace and the town clerk in each town in this State, to meet in their respective towns within thirty days from the date of the town election in each year and elect a citizen of such town of full age, who with them shall constitute the board of health for such town for one year or until their successors are chosen. The said board of health shall appoint some competent physician, not a member of said board, to be the health officer for such town. If in any case a vacancy shall occur in the board of health of any city, village or town, by the death, resignation, inability to act or removal from said

Membership and organization of town Boards of Health.

city, village or town of any member thereof, and if the proper authorities, by inability, neglect or refusal, fail to fill such vacancy, it shall be the duty of the county judge of the county in which such city, village or town is situated, upon being satisfied that such vacancy should be filled without delay, to appoint in writing a competent person to fill such vacancy for the unexpired term. The written appointment to a board of health made by a county judge under this section shall forthwith be filed in the office of the clerk of the county in which said board of health is located. Notice of the membership and organization of all boards of health in this State and of all changes that may from time to time occur therein shall be given forthwith to the State Board of Health.

Temporary vacancies, how filled.

§ 3. The several boards of health now organized in any city, village or town in this State (except in the cities of New York, Brooklyn and Buffalo), and the several boards of health constituted under this act shall have power and it shall be their duty:

Powers and duties of Health Boards.

1. To meet at stated intervals in their respective cities, villages and towns; also, whenever the State Board of Health, or the president and secretary thereof, shall, by notice to the presiding officer of any city, village or town board of health, request him to convene such board to take certain definite proceedings upon matters concerning which the said State Board of Health, or its president and secretary, shall be satisfied that the action recommended by them is necessary for the public good, and is within the jurisdiction of such board of health. Any willful violation of any lawful instruction of said State Board of Health shall be a misdemeanor.

In relation to meetings.

2. To prescribe the powers and duties of the local health officer, who shall act as executive officer of the board; to direct him from time to time in the performance of his duties, and to fix the compensation he shall receive.

In relation to health officer.

3. To guard against the introduction of contagious and infectious disease, by the exercise of proper and vigilant medical inspection and control of all persons and things arriving in such city, village or town from infected places, or which, for any cause, are liable to communicate contagion; to require the isolation of all persons and things infected with or exposed to contagious or infectious diseases, and to provide suitable places for the reception of the same; and, if necessary, to furnish medical treatment and care for sick persons who cannot otherwise be provided for; to prohibit and prevent all intercourse and communication with or use of infected premises, places and things; and to require, and, if necessary, to provide the means for the thorough purification and cleansing of the same before general intercourse therewith, or use thereof, shall be allowed. And it shall be the duty of every such board of health to report to the State Board of Health promptly facts which relate to infectious and epidemic diseases, and every case of small-pox or varioloid occurring within its jurisdiction; and to provide at stated intervals a suitable supply of vaccine virus of a quality or from a source approved by the State Board of Health; and during the existence of an actual epidemic of small-pox, said local board of health shall obtain fresh supplies of said virus at intervals not exceeding one week, and shall at all times provide thorough and safe vaccination for all persons within its jurisdiction who may need the same.

In reference to contagious and infectious diseases.

To provide medical treatment for sick.

To regulate isolation of and intercourse with infected persons and places.

To report to State Board of Health.

To provide for public vaccination.

4. To receive and examine into the nature of complaints made by any of the inhabitants concerning nuisances, or causes of danger or injury to life and health within the limits of its jurisdiction; to enter upon or within any place or premises where nuisances or conditions dangerous to life and health are known or believed to exist, and by appointed members or persons to inspect and examine the same; and all owners, agents and occupants shall permit such sanitary examinations; and said board of health shall furnish said owners, agents and occupants a written statement of results or conclusions of such examinations; and every such Board of Health shall have power, and it shall be its duty, to order the suppression and removal of nuisances and conditions detrimental to life and health found to exist within the limits of its jurisdiction.

To receive complaints of inhabitants.

To enter upon premises and places for sanitary examination.

5. To supervise and make complete the registration of all births, marriages and deaths occurring within the limits of its jurisdiction in accordance with the methods and forms prescribed by the State Board of Health, and to secure the prompt forwarding of the certificates of birth, marriage and death to the State Bureau of Vital Statistics after local registration; and in so completing the said registration the cost thereof shall be a charge upon such city, village or town, and shall not exceed fifty cents for each completely verified and registered record of birth, marriage or death. And to secure the completeness of the said registration it shall be the duty of the parents or custodian of every child, and the groom at every marriage, or the clergyman or magistrate performing the ceremony, to secure the return of the record of such birth or marriage to the Board of Health or person designated by them within thirty days from the date of such birth or marriage, and each record shall be duly attested by the physician or midwife (if any) in attendance at such birth, or the clergyman or magistrate officiating at such marriage. And it shall be the duty of the health officer of every such Board of Health to receive and examine and secure the registration of all certificates and records of death and causes of death and findings of coroners' juries, and said Board of Health shall designate the persons who shall grant burial permits for the burial of the dead, and transit permits for the transportation of the dead bodies of persons which are to be carried for burial beyond the limits of the county where the death occurs; and it shall be the duty of the undertaker, sexton or other person having charge of the body of any dead person to procure a record of the death and its probable cause duly certified by the physician in attendance on the deceased during his last illness or by the coroner where an inquest is required by law; and there shall be no burial nor removal of the body of any dead person until said duly certified record shall have been presented to the Board of Health or person designated by them, and until thereupon a permit for burial or transit shall have been obtained. And the said Board of Health shall prescribe sanitary regulations for such burials and removals of the dead. It shall also be the duty of every such Board of Health to provide for obtaining copies of the said registered records of births, marriages and deaths, and for the amount and payment of fees for such copies. Such copies, duly attested by the local registering officer, and verified transcripts from the records preserved in the State Bureau of Vital Statistics shall be admitted in all the courts of this State as *prima facie* evidence

To supervise and complete the registration of vital statistics.

Cost per record not to exceed fifty cents.

Duty of parents or custodians grooms, clergymen, magistrates, physician and midwife.

Undertaker to procure record of death.

No burial or removal without permit.

Verified transcript of records *prima facie* evidence.

of the facts therein set forth. If in any place in this State, the State Board of Health ascertains that the said registration of births, marriages and deaths is not completely and well made, said State Board shall notify the local Board of Health in such place, that within one month from the date of such notice, said defects and neglect in the records must be amended and prevented. If at the expiration of the time mentioned the said defects and neglect are not overcome and prevented by the said local authorities, it shall be the duty of the said State Board of Health to take control of the said records, and enforce the rules and regulations with reference thereto, and secure their completeness and proper registration within the limit of cost hereinbefore specified, and to continue such control until the said local Board of Health shall satisfy the said State Board of Health that they will actually make the said records and registry complete as required by law. Any person neglecting or refusing to make out or file for registration any record as aforesaid, and any person causing, permitting or assisting in the burial or removal of any dead body, unaccompanied by a permit for such burial or removal, duly issued by the local Board of Health having jurisdiction where the death occurred, and any officer or board that shall neglect or refuse to register and preserve the said records and forward the certificates to the State Bureau of Vital Statistics as above required shall be deemed guilty of a misdemeanor and may be prosecuted in any court of competent jurisdiction.

State Board of Health shall take control to remedy neglects and enforce compliance for a time.

Neglect or refusal to make out or file a record, or the burial or removal of a dead body a misdemeanor.

6. To make, and from time to time to publish, in such manner as to secure early and full publicity thereto, all such orders and regulations as they shall think necessary and proper for the preservation of life and health and the successful operation of this law; and to make, without publication thereof, such orders and regulations in special or individual cases, not of general application, as they may see fit concerning the suppression and removal of nuisances, and concerning all other matters in their judgment detrimental to public health, and to serve copies thereof upon any occupant or occupants and the owner or owners of any premises whereon any such nuisances or other matters aforesaid shall exist, or to post the same in some conspicuous place on such premises.

Orders and regulations to be published.

7. To issue warrants to any constable or police of their respective cities, villages and towns, to apprehend and remove such persons as cannot otherwise be subjected to the orders and regulations by them adopted; and whenever it shall be necessary to do so, to issue their warrant to the sheriff of their respective counties to bring to their aid the power of the county; all which warrants shall be forthwith executed by the officers to whom they shall be directed, who shall possess the like powers and be subject to the like duties in the execution thereof, as if the same had been duly issued out of any court of record in this State.

Power to issue warrants.

8. To employ all such persons as shall be necessary to enable them to carry into effect the orders and regulations they shall have adopted and the powers vested in them by this act, and to fix their compensation.

Employment of agents.

9. To impose penalties for the violation of, or non-compliance with, their orders and regulations, and to maintain actions in any court of competent jurisdiction to collect such penalties, not exceeding one hundred dollars in any one case, or to restrain by injunctions such violations, or otherwise to enforce such orders and regulations.

Board of Health may impose penalties or restrain violations by injunctions.

§ 4. Every person who shall willfully violate or refuse to obey any order or regulation made and published by the Board of Health of any city, village or town in this State, or any order made and served, or posted as aforesaid, shall be deemed guilty of a misdemeanor, and on conviction thereof shall be subject to fine or imprisonment, or both, in the discretion of the court, such fine not to exceed one thousand dollars nor such imprisonment six months. And in any case of non-compliance with any order or regulation which shall have been served or posted, as provided in subdivision six of section three of this act, the said board or its servants or employees may lawfully enter upon any premises to which such order or regulation relates, and suppress or remove the nuisance or other matters in the judgment of said board detrimental to the public health mentioned in such order or regulation, and any other nuisance or matter of the description aforesaid found there existing; and the expense thereof shall be a charge upon the occupant or any or all of the occupants of said premises, or upon the person or persons who have caused or maintained the nuisance or other matter of the description aforesaid, and may be sued for and recovered with costs by said board in the name of such board in any court having jurisdiction. Whenever execution upon any judgment so obtained shall have been returned wholly or in part unsatisfied, said judgment, for the amount so unsatisfied, shall be a lien upon said premises, having preference over all other liens or incumbrances whatsoever. But in order to acquire such lien, such judgment, if in a court not of record, shall first have been docketed in the same place and manner as by law now required to make judgments in such courts liens upon real estate. And whenever any lien upon any premises shall have become fixed as aforesaid, the said board may cause the said premises to be sold at public auction, for a term of time, for the payment and satisfaction of such lien, and the expenses of such sale, giving notice of such sale for twelve weeks successively, once in each week, in one or more newspapers published in the city, incorporated village or town where the premises are situated, as the case may be; or if no newspaper be published in such village or town, then in the newspaper published nearest said premises, and also serving a copy of such notice of sale personally on the owner or agent of said premises, if known, and a resident of said city, village or town, at least fourteen days previous to such sale, or by depositing the same in the post-office, directed to such owner or agent at his place of residence if known, or the nearest post-office thereto, at least twenty-eight days previous to such sale. And the said premises shall be sold to the person who shall offer to take the same for the shortest time, paying the amount remaining unpaid upon such judgment, with interest, and the expenses of such notice and sale. A certificate of such sale, signed by the president and countersigned by the secretary of such board, shall thereupon be made and delivered to the purchaser, and may be recorded in like manner and with like effect as deeds of conveyance of lands, and thereupon the purchaser, his heirs or assigns, shall be entitled to the possession of said premises so sold as aforesaid, and if unoccupied may immediately enter, and if occupied may have remedy against any occupant by action or by summary proceedings as against a tenant holding over after expiration of his term; and in case the costs of such action or proceeding shall not be collected by such purchaser of the defendant therein, the same shall be a lien upon said premises, having the like preference as the lien aforesaid, and the term of the said purchaser shall be extended during

Violating orders of the Board a misdemeanor.

Penalty.

Power to enter upon premises and suppress nuisances.

Unsatisfied judgment a lien upon the premises.

Sale of premises at public auction.

Certificate of sale.

a time bearing the same proportion to the original term as the amount of such cost bears to the amount paid by such purchaser on such sale. And such term shall commence when such purchaser shall have acquired possession. At any time after such sale and within six months after the recording of such certificate as aforesaid, the owner or any lienor or incumbrancer of such premises, or of any part thereof, may redeem by paying to the purchaser the amount paid by him on such sale, and all costs and expenses he may have incurred in any action or proceeding as aforesaid, to obtain possession, with ten per cent interest thereon. If such redemption be made by the owner, the right of the purchaser shall be extinguished; and if by such lienor or incumbrancer, the amount paid by him to redeem shall be added to his lien or incumbrance, or if he have more than one, to the oldest, and shall thenceforth partake of the nature thereof and be collectible by any remedy adapted thereto.

Expenses of Boards of Health to be a town, village or city charge, how audited and paid.

§ 5. All expenses incurred by the several boards of health in the execution and performance of the duties imposed by this act shall be a charge only on their respective cities, villages and towns; and shall be audited, levied, collected and paid in the same manner as other city, village and town charges are audited, levied, collected and paid.

Persons sick of infectious disease may be removed from county poor-house.

§ 6. Whenever any pestilential, or infectious or contagious disease shall exist in any county poor-house in this State, or in the vicinity of any such county poor-house, and the physician of such county poor-house shall certify that such pestilence or disease is likely to endanger the health of the persons supported at such poor-house, the superintendent of such county poor-house shall have power to cause the persons supported at such poor-house, or any of them, to be removed to such other suitable place in the same county as shall be designated by the Board of Health of the city, town or village within which such poor-house shall be situated, there to be maintained and provided for at the expense of the county, with all necessary medical care and attendance, until they shall be safely returned to the county poor-house from which they were taken, or otherwise discharged.

Village Boards and villages not taxed to support town sanitary improvements, nor towns to support village Boards of Health and their work.

§ 7. Any legally organized Board of Health in an incorporated village, which comprises parts of several towns, or less than a whole town, shall have full authority in regard to all matters relating to public health within said village, and such village shall not be subject to the sanitary regulations or health officers of the township or towns within which such village is located; nor shall the taxable property of any such village, while maintaining its own Board of Health, be subject to taxation for maintaining any town Board or Boards of Health, or for any expenditures authorized by such town boards; but such expenditures of the town Boards of Health shall be assessed and collected exclusively on property in the town outside of said village. But nothing in this act shall be construed to prevent the boards of health of two or more towns adjacent to each other or of towns and villages therein situated from uniting in a combined sanitary and registration district by the appointment of one health officer and registering officer for such district, whose authority in all matters of general application shall be derived from the several Boards of Health having jurisdiction within such district; and in special cases, not of general application, arising within the jurisdiction of any such Board of Health the said officers shall derive their authority from such board alone. Such combined districts shall be formed subject to the approval of the State Board of Health.

Provision for combined sanitary and registration districts.

§ 8. Any duty prescribed or enjoined by this act upon any local Board of Health, or any member or officer thereof, or upon the common council of any city or any member thereof, or upon the board of trustees of any village or any member thereof, or upon any officer of any city, village or town may be enforced by a mandamus at the instance of the State Board of Health, its president, secretary or any member thereof. State Board may enforce duty upon local Boards by mandamus.

§ 9. Chapter one hundred and fifty-two of the laws of eighteen hundred and forty-seven, chapter three hundred and twenty four of the laws of eighteen hundred and fifty and the several acts amendatory thereof, chapter five hundred and twelve of the laws of eighteen hundred and eighty, except subdivision thirty-four of section one of said act, and all other acts or parts of acts, general or special, inconsistent with the provisions of this act are hereby repealed.

[No. 53.]

SANITARY REGULATIONS.

Adopted by the Board of Health of————————

SECTION 1. Whatever is dangerous to human life or health; whatever building, or part or cellar thereof, is overcrowded or not provided with adequate means of ingress and egress, or is not sufficiently supported, ventilated, sewered, drained, lighted or cleaned; and whatever renders soil, air-water or food impure or unwholesome, are declared to be nuisances and to be illegal; and every person having aided in creating or contributing to the same, or who may support, continue or retain any of them, shall be deemed guilty of a violation of this ordinance, and shall also be liable for the expense of the abatement or remedy required. Nuisances defined.

§ 2. No privy-pit, cess-pool or reservoir into which any privy, water-closet, stable, sink or other receptacle of refuse or sewage is drained, shall be constructed or maintained in any situation or in any manner whereby, through leakage or overflow of its contents, it may cause pollution of the soil near or about habitations, or of any well, spring or other source of water used for drinking or culinary purposes, nor shall the overflow from any such reservoir or receptacle be permitted to discharge into any public place or in anywise whereby danger to health may be caused. And every such pit, reservoir or receptacle shall be cleaned and the contents thereof removed at such times and under such precautions as the board of health may prescribe. Violation of any of the provisions of this ordinance shall be punished by a fine of.... ...for each day's continuance of the nuisance after due notice to abate it from an authorized officer. Privies, cess-pools, etc.

§ 3. All house-sewers or drains for the conveyance of deleterious or offensive matters shall be water-tight, and the plans and methods of their construction shall be subject to the approval of the board of health. In streets or avenues where public sewers are or shall be constructed, the board of health may order house-connections to be made therewith. Sewers, drains, etc.

§ 4. No house-refuse, offal, garbage, dead animals, decaying vegetable matter, or organic waste-substance of any kind, shall be thrown upon any street, road or public place, and no putrid or decaying animal or vegetable matter shall be kept in any house, cellar or adjoining outbuilding for more than twenty-four hours. Violation of any of the provisions of this ordinance shall be punished by a fine of..... House refuse, garbage, etc.

§ 5. No sunken places shall be filled, nor made land constructed, with any materials containing an admixture of putrescible animal or vegetable matter, under penalty of not less than.....nor more than..... for each cart-load, or part thereof, of such materials deposited Filled-in or made land.

§ 6. No person or company shall erect or maintain any manufactory or place of business dangerous to life or detrimental to health, or where Noxious trades.

unwholesome, offensive or deleterious odors, gas, smoke, deposit or exhalations are generated, without the permit of the board of health, and all such establishments shall be kept clean and wholesome so as not to be offensive or prejudicial to public health; nor shall any offensive or deleterious waste-substance, gas-tar, sludge, refuse or injurious matter be allowed to accumulate upon the premises or be thrown or allowed to run into any public waters, stream, water-course, street or public place. And every person or company conducting such manufacture or business shall use the best approved and all reasonable means to prevent the escape of smoke, gases and odors, and to protect the health and safety of all operatives employed therein. Any violation of any of the provisions of this ordinance shall be punishable by a fine of not less than ten dollars nor more than one hundred dollars for each offense.

Unwholesome food.

§ 7. No meat, fish, bird, fruit, or vegetables, milk, or any thing for human food or drink, not being then fresh or properly preserved, sound, wholesome and safe for such use; nor any flesh of any animal which died by disease, or which was at the time of its death in a sickly or unwholesome condition; nor the carcass or meat of any calf which was at the date of its death less than four weeks old, or of any lamb which was at the date of its death less than eight weeks old, or of any pig which was at the date of its death less than five weeks old shall be brought within the limits of this.... ...nor offered or held for sale as food therein. Any violation of any of the provisions of this ordinance shall be punishable by a fine of not less than .... and by the seizure and destruction of such unsound, unwholesome, or immature food substances.

Slaughter-houses, markets, etc.

§ 8. No person or persons, without the consent of the board of health, shall build or use any slaughter-house within the limits of this.....; and the keeping and slaughtering of all cattle, sheep and swine, and the preparation and keeping of all meat, fish, birds, or other animal food, shall be in the manner best adapted to secure and continue their wholesomeness as food; and every butcher or other person owning, leasing or occupying any place, room or building wherein any cattle, sheep or swine have been or are killed or dressed, and every person being the owner, lessee or occupant of any room or stable wherein any animals are kept, or of any market, public or private, shall cause such place, room, building, stable or market, and their yards and appurtenances, to be thoroughly cleansed and purified, and all offal, blood, fat, garbage, refuse and unwholesome and offensive matter to be removed therefrom at least once in every twenty-four hours after the use thereof for any of the purposes herein referred to, and shall also at all times keep all woodwork, save floors and counters, in any building, place or premises aforesaid thoroughly painted or whitewashed; and the floors of such building, place or premises shall be so constructed as to prevent blood or foul liquids or washings from settling in the earth beneath. Any violation of any of the provisions of this ordinance shall be punished by a fine of.....for each day's continuance or repetition of the offense.

Notification of infectious disease.

§ 9. Every householder or head of family in a house wherein any case of infectious disease may occur shall report the same to the board of health or to the health officer within twelve hours from the time of his or her first knowledge of the nature of such disease; and, until instructions are received from the said board or the health officer, shall not permit any clothing or other article which may have been exposed to infection to be removed from the house; nor shall any occupant change his residence elsewhere without the consent of the said board or health officer.

Every physician who may be called to attend a case of infectious disease shall,

as soon as he discovers the nature thereof, make a written report specifying the name and residence of the patient, the nature of the disease, and any other facts relating thereto which he may deem important to the public health, and affix the date and sign his name thereto, and he shall hand such report to the householder or head of family as aforesaid, who shall thereupon become responsible for its transmission to the board of health within twelve hours as above provided. The diseases to be thus promptly reported are: Asiatic cholera, yellow fever, typhus and typhoid fevers, small-pox, scarlet fever, measles, and diphtheria. Any violation of any of the provisions of this ordinance shall be punished by a fine of.....

Importation of infected persons or things.

§ 10. No person or article liable to propagate a dangerous disease shall be brought within the limits of this.....unless by the special permit and direction of the board of health; and any one having knowledge that such person or article has been brought within such limits shall immediately notify the said board thereof. Any violation of any of the provisions of this ordinance shall be punished by a fine of not less than..... ....nor more than .....

Exposure of infected persons or things.

§ 11. No person shall, within the limits of this.....unless by permit of the board of health, carry or remove from one building to another any patient affected with any contagious or infectious disease. Nor shall any person, by any exposure of any individual so affected, or of the body of such individual, or of any article capable of conveying contagion or infection, or by any negligent act connected with the care or custody thereof, or by a needless exposure of himself or herself, cause or contribute to the spread of disease from any such individual or dead body. Any violation of any of the provisions of this ordinance shall be punished by a fine of not less than.....

Funerals after infectious diseases.

§ 12. There shall not be a public or church funeral of any person who has died of Asiatic cholera, small-pox, typhus fever, diphtheria, scarlet fever or measles, without the permit of the board of health therefor; and the family of the deceased shall in all such cases limit the attendance to as few as possible, and take all precautions possible to prevent the exposure of other persons to contagion or infection. Any violation of any of the provisions of this ordinance shall be punished by a fine of not less than.....

Infectious diseases of animals.

§ 13 No animal affected with an infectious or contagious disease shall be brought or kept within the limits of this.....except by the permission of the board of health; and the bodies of animals dead of such disease, or killed on account thereof, shall not be buried within five hundred feet of any residence, nor disposed of otherwise than as the said board or its health officer shall direct. Any violation of any of the provisions of this ordinance shall be punished by a fine of not less than.....

Report of marriages and births.

§ 14. It shall be the duty of the groom in every marriage and of the parent or custodian of every child born, to make sure that the prescribed report of such marriage or birth is presented to the board of health or its registering officer within thirty days, under a penalty of.....for failure to do so; and for each ten days of continued neglect to present such report, after the expiration of the first thirty days, an additional penalty of.....shall be incurred.

Certificates of death and burial permits.

§ 15. Every undertaker or other person who may have charge of the funeral of any dead person, shall procure a properly filled-out certificate of the death and its probable cause, in accordance with the form prescribed by the State Board of Health, and shall present the same to the desig-

nated officer or member of the board of health, and obtain a burial or transit permit thereupon, at least twenty-four hours before the time appointed for such funeral; and he shall not remove any dead body until such burial or transit permit shall have been procured. Any violation of any of the provisions of this ordinance shall be punished by a fine of not less than.....

Sextons, cemetery keepers, etc.

§ 16. Every person who acts as a sexton, or undertaker, or cemetery keeper, within the limits of this .... ..or has the charge or care of any tomb, vault, burying ground or other place for the reception of the dead, or where the bodies of any human beings are deposited, shall so conduct his business and so care for any such place above named, as to avoid detriment or danger to public health; and every person undertaking preparations for the burial of a body dead from contagious or infectious disease as hereinbefore enumerated shall adopt such precautions as the board of health may prescribe to prevent the spread of such disease. Any violation of any of the provisions of this ordinance shall be punished by a fine of not less than.....

Coroners' inquests.

§ 17. Before the holding of any inquest within this.....the coroner, who may intend to hold such inquest shall notify the board of health or the health officer of the place where the body is; what is reported to have been the cause, place, and date of death; where the body has since been; when and where the proposed inquest is to be held; and, if known, what physician attended the deceased person within forty-eight hours of such decease. And within forty-eight hours after the termination of such inquest such coroner shall cause to be transmitted to the board of health or to the health officer a certificate according to the form prescribed by the State Board of Health, supplying the data therein required to the best of his information and belief. Any violation of any of the provisions of this ordinance shall be punished by a fine of.....

Duties and powers of health officer.

§ 18. The health officer is directed and empowered to execute and enforce all sanitary regulations of general obligation now or hereafter to be published by this board; also to enter upon or within any premises where conditions dangerous to the public health are known or believed to exist, and to examine into the nature of complaints made by any of the inhabitants concerning sources of danger or injury to health; and he shall preserve accurate records of his official actions and report the same to the board of health at its next meeting. And whenever in his judgment danger to public health shall arise requiring special regulation not of general application, he shall forthwith notify the president of the board of health, who shall thereupon convene the board to take such action as may be necessary and proper.

Penalties.

§ 19. Every person who willfully violates or refuses to comply with, or who resists any ordinance, order, regulation or resolution of the board of health of this.....will be liable to the arrest, action, penalty, fine and punishment provided and declared in chapter 270 of the Laws of 1885, of which notice must be taken.

RECORD OF STILL-BIRTHS.

Date of birth.	Sex.	Color.	Month of pregnancy.	Cause of dead birth (if known).	Name of mother.	Nativity of mother.	Residence.	Name of person making return.	Undertaker.	Place of burial.

MONTHLY BULLETINS

OF THE

NEW YORK STATE BOARD OF HEALTH.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of reports of deaths and their causes in the following districts, cities and towns, during January, 1885.

[Cities are printed in small capitals, villages in italics and towns in Roman type. The populations preceded by a star (*) are estimated to date; the remainder are from the census of 1880.]

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DISTRICT:																												
NEW YORK CITY	*1,397,895	2,965	25.46	1,197	43.7	25	1	16	24	0	72	150	22	28	178	64	195.62	532	475	41	137	213	164	261	55	62	209	336
BROOKLYN	*665,602	1,143	20.60	410	35.7	0	1	7	17	0	25	12	0	12	91	7	150.48	149	177	14	70	54	59	110	26	23	24	165
Gravesend	*5,000	5	12.00	1	20.0	0	0	0	0	0	0	0	0	0	0	0	.....	2	0	0	1	0	1	1	0	0	0	0
New Lots	*18,000	26	17.33	12	46.16	1	0	0	2	0	0	0	0	0	2	0	192.30	6	7	0	0	0	0	1	1	0	3	3
New Utrecht	4,742	4	10.12	2	50.0	0	0	0	0	0	2	0	0	0	0	0	500.00	0	0	0	0	0	2	0	0	0	0	0
Flatlands	3,127	7	26.86	1	14.3	0	0	0	1	0	1	0	0	0	0	0	285.71	0	1	0	0	0	0	1	0	2	1	0
LONG ISLAND CITY	*21,000	32	18.29	11	34.4	1	0	0	0	0	0	0	0	0	3	0	125.00	6	5	0	2	4	2	3	3	3	2	2
Newtown	*10,000	21	25.20	9	42.9	0	0	0	0	0	0	0	0	0	4	0	190.48	4	3	0	1	1	0	6	0	0	1	1
Oyster Bay	*12,000	16	16.00	1	6.2	0	0	0	0	0	0	0	0	0	0	1	62.30	2	2	0	0	1	0	1	0	1	2	7
Hempstead	18,160	8	4.00	1	16.7	0	0	0	1	0	0	2	0	0	0	0	166.66	0	0	0	0	1	0	1	0	0	3	0
North Hempstead	*7,000	10	17.14	5	50.0	1	0	0	0	0	0	0	0	0	1	0	400.00	2	2	0	1	0	0	0	0	0	1	0
Sag Harbor	*3,000	3	12.00	1	33.3	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	1	0	0	0	0	0	1
Babylon	4,739	9	22.79	2	22.2	0	0	0	0	0	0	0	0	0	0	0	.....	2	0	1	0	1	1	4	0	0	0	0
Southold	7,267	2	3.43	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	0	0	0	0	0	0	0	1
Southampton	6,352	9	17.00	1	11.1	0	0	2	0	0	1	0	0	0	0	0	333.33	1	0	0	0	0	0	4	0	0	1	0
Northfield	7,014	8	13.80	2	25.0	0	0	0	0	0	1	0	0	0	1	1	250.00	2	2	0	0	0	1	0	1	0	0	0
Westfield	5,289	7	15.88	1	14.3	0	0	0	0	0	0	0	1	0	0	0	142.86	1	2	0	0	0	0	1	0	0	0	2
YONKERS	*22,000	37	20.18	11	29.7	0	0	0	0	0	4	0	0	0	0	1	133.33	8	7	0	0	0	0	3	1	1	2	10
Westchester	*6,900	10	17.40	1	10.0	1	0	0	0	0	0	0	0	0	0	0	100.00	3	1	0	1	0	2	0	2	0	0	0
Rye	*7,500	4	6.40	1	25.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	2	1	0	0	1	0
Sing Sing	*6,500	13	24.00	1	7.7	0	0	0	0	0	0	0	0	0	0	0	.....	1	2	0	0	2	3	5	0	0	0	0
Rest of district	.....	32	.....	8	25.0	0	0	0	0	0	0	0	0	0	4	2	187.50	7	6	0	1	0	2	4	1	1	2	2
HUDSON VALLEY DIST.:																												
ALBANY	*99,495	162	19.54	32	20.0	1	0	6	0	0	0	0	0	0	11	4	135.80	19	34	6	12	6	14	29	5	4	5	12
COHOES	*20,000	38	22.80	16	42.10	1	0	2	2	0	1	1	0	0	3	0	363.16	8	5	0	3	0	4	4	0	0	2	2
West Troy	*13,000	16	14.84	7	43.8	0	0	0	0	0	1	0	0	0	1	0	125.00	6	2	0	0	0	1	2	0	0	1	2
Hoosick Falls	*4,000	2	6.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	1	0	0	0	0

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MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH — (*Continued*).

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MOHAWK VALLEY DIST.:																												
Saratoga Springs	*10,000	21	25.20	4	19.0	0	0	0	0	0	0	0	0	0	0	1	47.62	2	3	0	2	0	4	6	1	0	0	2
Rest of district	.....	77	.....	8	10.4	0	0	3	1	0	0	1	0	0	4	0	116.88	12	16	1	2	4	3	8	5	0	8	9
SOUTHERN TIER DIST.:																												
BINGHAMTON	*20,000	29	17.40	7	24.1	0	0	0	1	0	2	0	1	0	0	0	137.93	3	3	1	3	2	3	6	1	1	1	1
Candor	4,323	8	22.20	2	25.0	0	0	0	0	0	0	0	0	0	0	0	.....	3	1	0	0	0	1	1	0	1	1	0
ELMIRA	*25,000	36	17.28	8	22.2	0	0	1	0	0	0	0	0	0	1	1	83.33	4	9	0	3	0	3	8	3	1	1	0
Horseheads	*3,500	5	17.14	1	20.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	2	1	1	0	1
Jamestown	*12,000	14	14.00	2	14.3	0	0	0	0	0	0	0	0	0	0	0	.....	0	2	2	2	0	4	2	1	1	0	3
Westfield	3,500	4	13.71	0	.....	0	0	1	0	0	0	0	0	0	0	0	250.00	0	0	0	0	0	0	0	0	0	3	1
Hornellsville	*10,000	12	14.40	1	8.33	0	0	1	0	0	0	0	0	0	1	0	166.67	2	1	0	3	0	0	1	0	0	2	0
Bath	7,400	8	13.00	2	25.0	0	0	0	0	0	0	0	0	0	1	0	125.00	3	1	0	0	0	1	1	0	0	0	1
Rest of district	.....	23	.....	4	17.4	0	0	0	0	0	2	0	0	0	1	0	130.43	9	0	0	1	0	1	1	2	0	1	2
EAST CENTRAL DIST.:																												
Walton	3,541	6	20.30	1	16.7	0	0	0	0	0	0	0	0	0	1	0	166.67	2	1	0	0	0	1	0	0	0	0	1
Delhi	3,000	4	16.00	1	25.0	0	0	0	0	0	0	0	0	0	0	0	.....	1	1	0	0	1	0	0	0	0	0	1
Cooperstown	*3,000	5	20.00	3	60.0	0	0	0	0	0	0	0	0	0	0	1	200.00	2	0	0	1	0	1	0	0	0	0	0
Oneonta	*5,000	12	28.80	2	16.6	0	0	0	0	0	0	0	0	0	0	0	.....	3	1	1	0	0	2	3	1	0	0	0
Worcester	*3,000	2	8.00	1	50.0	0	0	0	0	0	0	0	0	0	1	0	500.00	0	1	0	0	0	0	0	0	0	0	0
Brookfield	3,685	7	22.75	0	.....	0	0	0	0	0	0	1	0	0	0	0	142.86	3	0	0	0	1	0	0	1	0	0	2
Norwich	5,755	7	14.70	2	28.6	0	0	0	0	0	0	0	0	0	0	0	.....	2	2	0	0	1	0	1	1	0	0	2
SYRACUSE	*65,000	90	16.80	22	24.2	3	0	1	1	0	0	0	0	0	4	0	98.90	16	14	1	7	1	12	7	2	4	2	2
Geddes	7,000	3	5.14	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	1	0	0	0	0	0	0	0	0
Salina	*3,000	6	20.00	2	40.0	0	0	1	0	0	0	0	0	0	0	0	200.00	1	1	0	2	0	0	0	0	0	0	0
Skaneateles	*5,000	3	7.20	1	33.3	0	0	0	0	0	0	0	0	0	0	1	333.33	0	0	0	0	0	1	1	0	0	1	0
Homer	*3,500	4	15.14	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	1	0	0	0	1	0	0	1	2	0
Rest of district	.....	69	.....	11	16.2	0	0	1	2	0	1	0	0	0	7	1	176.47	10	5	3	4	6	2	6	4	2	12	3
WEST CENTRAL DIST.:																												
AUBURN	*26,000	26	12.00	5	19.2	0	0	2	0	0	0	0	0	0	1	0	115 38	4	4	0	2	2	2	5	0	1	1	2
Groton	3,450	2	6.95	1	50.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	1	0	1	0	0
Seneca Falls	6,853	5	8.78	2	40.0	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	2	0	0	2	0	1	0	0
Ithaca	11,198	9	9.65	3	33.3	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	0	2	2	2	0	0	1	1

Waterloo	*4,500	3	8.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	0	0	1	0	1
Hector	5,025	3	7.20	2	66.6	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	0	0	0	1	0	1	0	0
Canandaigua	*6,300	10	19.05	2	20.0	0	0	0	0	0	0	0	0	0	0	0	.....	4	2	0	0	0	2	2	0	0	0	0
Manchester	*4,000	3	9.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	0	0	0	2	0
Phelps	*7,000	9	15.43	2	22.2	0	0	0	0	0	0	0	0	0	0	0	.....	0	2	0	0	0	0	2	1	1	1	2
Geneva	*6,000	11	22.00	1	10.0	0	0	0	0	0	0	0	0	0	0	0	.....	1	3	1	0	0	2	2	0	0	2	0
Penn Yan	*4,500	6	16.00	1	16.6	1	0	1	0	0	0	0	0	0	0	0	333.33	0	0	0	0	0	2	1	1	0	0	0
Luna	*2,800	2	8.57	1	50.0	0	0	0	0	0	0	0	0	0	1	0	500.00	0	0	0	0	0	0	0	0	0	1	0
Rest of district	.....	81	.....	11	13.6	0	0	2	0	0	1	0	0	1	2	1	86.42	8	15	0	6	2	10	9	3	7	10	4
LAKE ONTARIO & WESTERN DISTRICT:																													
Oswego	*24,000	31	15.50	11	35.5	0	0	1	0	0	1	2	0	2	0	0	193.55	5	3	0	1	2	3	3	1	3	2	2
Lyons	*6,000	21	43.00	4	17.4	0	0	2	0	0	0	0	0	0	0	0	95.24	5	3	0	0	0	1	5	1	1	3	0
Arcadia	5,702	7	14.74	1	14.3	0	0	0	0	0	0	0	0	0	0	1	142.86	0	1	0	0	0	0	3	0	1	1	1
Palmyra	*4,800	5	12.50	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	3	1	0	0	0	0	1	0	0	0	0
Wolcott	3,753	5	15.10	1	20.0	0	0	0	0	0	0	1	0	0	0	0	200.00	2	0	0	0	0	0	0	0	0	1	1
ROCHESTER	*101,000	180	21.38	58	32.2	0	0	8	1	0	1	0	2	0	22	0	188.89	24	22	3	8	11	6	34	5	3	8	22
Sweden	5,736	5	10.46	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	2	0	0	0	1	0	0	0	2	0
Greece	*5,000	3	7.20	0	.....	0	0	0	0	0	1	0	0	0	0	0	333.33	0	0	0	0	0	0	0	0	0	2	0
Mendon	3,200	4	15.00	1	25.0	0	0	0	0	0	0	0	0	0	1	1	500.00	0	2	0	0	0	0	0	0	0	0	0
Brighton	3,736	8	25.69	1	12.5	0	0	0	0	0	0	0	0	0	0	0	.....	1	1	0	1	3	0	1	1	0	0	0
Ogden	*3,000	5	20.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	1	2	1	1	0	0	0
Albion	5,147	3	7.00	0	.....	0	0	1	0	0	0	0	0	0	0	0	333.33	0	0	0	0	1	0	1	0	0	0	0
LOCKPORT	*16,000	18	13.50	0	.....	0	0	0	0	0	0	0	0	1	0	0	55.56	4	6	0	0	0	2	0	1	0	0	0
Tonawanda	4,900	10	24.50	3	30.0	0	0	2	0	0	0	0	0	0	0	0	200.00	0	3	0	1	0	0	1	0	0	1	0
Hamburg	3,235	3	11 13	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	0	0	0	0	2	0	0	0
Rest of district	.....	91	.....	10	11.3	0	0	3	2	0	0	2	0	0	2	1	113.64	11	9	0	8	8	9	9	2	4	16	5
Totals for the State	.....	6,571	.....	2,163	32.95	42	2	92	64	0	127	177	29	58	443	104	111.20	1,078	1,028	93	329	371	404	691	148	165	425	701

REMARKS.— The total reported mortality for the month is 6,571, the percentage of infant mortality being 32.95. From croup and diphtheria, the percentage of mortality is 6.8; from consumption, 15.8; from other respiratory diseases, 16.4; from typhoid fever, 1.4; from all zymotic diseases, 11.12. Attention is called to the addition in the table of a column showing the rate per thousand of deaths from zymotic diseases to deaths from all causes in each locality; in estimating the significance of this list, the populations must be considered, although these are now too inexact to base a ratio ot these diseases upon. The reports of a number of localities, some of which have been already mentioned, are still too imperfect to be taken as an exhibit of their heathfulness compared with other communities which send full returns; but material improvement has been secured since the publication of this Bulletin was commenced.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of reports of deaths and their causes in the following districts, cities and towns, during February, 1885.

	Population.	Total number of deaths.	Representing annual death rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DISTRICT:																												
NEW YORK CITY	*1,397,395	3,066	26.33	1,249	40.7	18	1	11	39	0	73	119	16	27	209	49	183.30	666	450	33	122	186	182	281	68	103	224	189
BROOKLYN	*665,602	1,167	21.04	453	38.8	0	0	3	12	0	30	17	11	17	79	20	161.96	286	165	28	46	65	58	109	16	22	18	165
Gravesend	*5,000	6	14.40	3	50.0	0	0	1	0	0	0	0	0	0	0	0	166.67	1	0	0	1	1	0	1	0	0	0	1
New Lots	*18,000	31	20.06	20	64.51	1	0	2	0	0	1	0	0	0	2	0	193.55	3	3	0	4	0	3	1	0	2	0	4
New Utrecht	4,742	11	28.00	2	18.2	0	0	0	0	0	0	0	0	0	0	0	.....	3	2	0	0	0	2	3	0	0	1	0
Flatlands	3,127	3	11.51	1	33.3	0	0	0	1	0	0	0	0	0	1	0	333.33	0	0	0	0	0	0	1	0	0	0	0
LONG ISLAND CITY	*21,000	43	24.57	15	34.9	0	0	0	1	0	0	0	0	1	0	1	162.79	17	0	1	1	0	7	8	1	0	1	2
Newtown	*10,000	21	25.20	4	19.0	0	0	0	1	0	0	0	0	0	3	0	190.46	5	1	0	1	0	2	3	0	2	1	3
Oyster Bay	*12,000	16	16.00	0	.....	0	0	2	0	0	0	0	0	0	0	0	125.00	3	5	1	0	1	0	0	0	0	1	2
Hempstead	18,160	21	13.87	11	52.4	0	0	0	1	0	3	2	0	0	2	0	380.05	4	3	0	1	1	0	1	0	0	1	2
North Hempstead	*7,000	11	18.86	3	33.3	0	0	0	0	0	0	1	0	0	0	0	90.90	3	1	0	1	0	1	1	1	1	1	0
Babylon	4,739	8	20.25	2	25.0	0	0	0	0	0	0	0	0	0	0	0	.....	3	3	0	0	0	0	2	0	0	0	0
Southold	7,267	13	21.46	7	53.8	0	0	0	0	0	0	0	0	1	0	0	76.92	6	3	0	0	0	2	0	0	0	0	1
Southampton	6,352	7	13.21	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	1	1	2	0	0	1	1
Northfield	7,014	9	15.43	0	.....	0	0	0	0	0	0	0	0	0	1	0	111.11	4	0	0	0	0	2	0	1	0	2	0
Westfield	5,289	7	15.88	1	14.3	0	0	0	0	0	0	0	0	0	0	0	.....	1	2	0	0	0	0	1	1	1	1	0
YONKERS	*22,000	22	12.00	7	31.8	0	0	0	0	0	0	1	0	0	1	0	90.90	7	3	1	0	1	1	2	1	1	1	1
Westchester	*6,900	9	15.66	2	16.7	0	0	0	0	0	0	1	0	0	0	0	111.11	2	0	0	0	0	0	2	0	2	1	1
Rye	*7,500	5	7.07	1	20.0	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	0	1	1	1	0	0	1	0
Sing Sing	*6,500	13	24.00	2	15.3	0	0	0	0	0	0	0	0	0	0	1	76.92	1	3	0	1	0	1	2	0	0	2	2
Rest of district	.....	29	.....	3	.....	0	0	0	0	0	1	0	1	0	2	0	.....	4	9	1	0	0	5	5	0	0	1	0
HUDSON VALLEY DIST.:																												
ALBANY	*99,435	155	18.71	39	25 2	0	0	1	0	0	2	1	0	0	7	0	70.97	22	31	2	16	2	16	22	5	5	8	15
COHOES	*20,000	18	10.80	7	38.9	0	0	0	0	0	0	0	0	0	0	0	.....	3	5	0	0	0	0	2	1	2	1	4
West Troy	*13,000	24	22.22	8	33.3	0	0	0	0	0	0	0	0	0	0	0	.....	9	1	0	1	0	2	5	0	0	4	1
Hoosac Falls	*4,000	5	15.00	2	40.0	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	1	0	0	0	2	0	0	1	1
TROY	*60,000	103	20.60	25	24.5	0	0	1	0	0	2	0	0	0	8	1	116.50	10	20	1	7	6	9	30	2	3	3	3
Lansingburgh	*8,500	19	26.82	5	26.2	0	0	1	0	0	0	0	0	0	6	0	315.62	3	2	0	0	3	3	1	0	0	1	0
Green Island	*5,000	2	4.80	2	100.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	1	0	1
Greenbush	*7,000	10	17.14	5	50.0	3	0	0	0	0	0	0	0	0	0	0	300.00	2	1	0	0	0	1	1	0	1	0	0

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MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH—(*Continued*).

	Population.	Total number of deaths.	Representing annual death rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
SOUTHERN TIER DIST.																												
ELMIRA	*25,000	37	17.76	11	29.7	0	0	0	0	0	4	0	0	0	0	0	108.11	3	4	0	1	0	4	6	4	3	5
Horseheads	*3,500	3	10.29	2	66.7	0	0	0	0	0	0	0	0	0	0	0	333.33	1	0	0	0	0	1	0	0	0	0	0
Hornellsville	*10,000	18	21.60	5	27.8	1	0	0	0	0	0	0	0	0	0	0	52.78	1	1	0	0	0	0	0	1	0	1	0
Bath	7,400	9	14.60	1	11.1	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	0	0	0	0	0
Owego	8,000	7	10.50	1	57.1	0	0	0	0	0	1	0	0	0	1	0	285.71	1	3	0	0	0	0	0	0	0	1	0
Jamestown	*12,000	12	12.00	5	41.7	0	0	1	0	0	0	0	1	0	0	0	83.33	2	0	0	0	0	0	0	0	0	0	0
Westfield	3,500	4	13.72	0	.....	0	0	0	0	0	0	0	0	0	0	0	250.00	1	0	0	1	0	0	0	0	0	0	0
Rest of district	.....	24	.....	3	12.5	0	0	0	0	0	0	0	0	0	0	1	.....	3	2	1	1	0	4	2	1	0	2	3
EAST CENTRAL DIST.																												
Walton	3,541	4	13.55	1	25.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	0	0	0	0	0
Delhi	3,000	4	16.00	0	....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0
Liberty	3,209	6	22.50	2	33.3	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0
Cooperstown	*3,000	3	12.00	1	33.3	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0
Oneonta	*7,000	9	15.43	3	33.3	0	0	0	0	0	0	0	0	0	0	0	111.11	0	2	0	0	0	0	0	0	0	0	0
Worcester	3,000	3	12.00	1	33.3	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	0	0	0	0	0
Brookfield	3,685	2	6.51	1	50.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0
Norwich	5,755	3	6.25	0	....	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	0	0	0	0	0	0	0	0
SYRACUSE	*65,000	89	16.43	17	19.1	0	0	0	0	0	0	0	0	0	0	0	146.47	18	14	0	4	3	2	0	9	3	0	1	15
Geddes	7,000	2	3.43	1	50.0	0	0	0	0	0	0	0	0	0	0	0	500.40	0	1	0	0	0	0	0	0	0	0	1	0
Homer	3,500	4	13.71	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	1	0	0	0	0	0	1	0	1
Rest of district	.....	66	.....	10	15.2	1	0	1	0	0	0	0	2	0	3	0	106.06	14	7	2	1	0	3	7	2	3	8	3	3
WEST CENTRAL DIST.																												
AUBURN	*26,000	32	14.77	7	21.9	0	0	0	0	0	0	0	0	0	1	0	31.25	10	5	0	1	0	1	6	1	2	2	1
Groton	3,450	7	24.35	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	1	0	0	0	3	0	1
Ithaca	11,198	14	15.00	4	28.6	0	0	0	0	0	0	0	0	0	0	0	214.29	8	0	0	0	0	0	1	0	0	1	0	1
Fayette	3,316	3	10.91	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0	0
Waterloo	*5,000	8	19.20	3	37.5	0	0	0	0	0	0	0	0	0	0	0	125.00	0	0	0	0	0	0	0	0	0	0	0	0
Seneca Falls	6,853	17	29.76	5	29.4	0	0	0	0	0	0	0	0	0	1	0	58.82	2	3	0	0	0	1	3	0	1	0	0	0
Hector	5,025	4	9.60	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0	0
Manchester	*4,000	6	18.00	2	33.3	0	0	0	0	0	0	0	0	0	0	0	.....	1	2	0	1	0	0	1	0	0	0	0	0
Canandaigua	6,30	6	11.43	1	16.7	0	0	0	0	0	0	0	0	0	0	1	333.33	1	1	0	1	0	0	0	0	0	0	0	0
Geneva	*6,000	14	28.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	4	2	0	1	0	0	2	0	1	0	0	0

Lima	*2,800	8	34.28	1	12.5	0	0	0	0	0	0	0	0	0	0	0	2	0	250.00	3	2	0	0	0	0	0	0	0	1	0
Rest of district	.....	94	.....	9	9 5	0	0	1	1	0	0	0	1	0	0	0	0	0	22.73	19	14	2	5	7	10	9	2	5	10	9
LAKE ONTARIO & WESTERN DISTRICT:																														
OSWEGO	*24,000	30	15.00	13	43.3	0	0	0	0	0	0	1	0	2	1	1	166.66	5	3	0	1	1	4	4	0	0	5	2		
Fulton	*5,000	6	14.40	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	1	1	2	1	0	0	1	2		
Lyons	*6,000	10	20.00	2	20.0	0	0	1	0	0	0	0	0	0	0	0	100.00	2	1	0	1	1	0	1	0	0	1	0		
Arcadia	5,702	4	8.43	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	4	0		
Palmyra	*4,800	3	7.50	1	33.3	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	1	0	0	0	1	1		
Wolcott	3,753	5	15.99	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	2	0	0	0	1	0	0	0	1	0		
Sodus	5,285	7	15.90	3	42.9	0	0	0	0	0	0	0	0	1	0	0	142.86	1	2	0	0	0	1	2	0	0	0	0		
ROCHESTER	*101,000	134	15.92	40	29.8	0	0	3	1	0	0	0	3	0	13	2	164.18	19	10	2	6	7	7	22	4	7	6	22		
Sweden	5,735	9	18.83	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	0	0	2	2	1	0	2	1		
Greece	*5,000	7	16.80	2	28.6	0	0	0	0	0	0	0	0	0	0	0	.....	1	2	0	0	2	0	2	0	0	0	0		
Penfield	*3,000	4	16.00	2	50.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	2	1	0	1	0	0	0	0		
Ogden	*3,000	3	12.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	2	0	0	0	0	1	0	0	0	0		
LOCKPORT	*16,000	11	8.25	1	9.1	0	0	1	0	0	0	0	0	0	0	0	90.91	0	1	0	0	0	4	0	1	0	4	0		
Tonawanda	4,900	3	9.23	2	66.6	0	0	0	0	0	0	0	0	0	0	0	.....	1	1	0	0	0	0	0	0	0	0	1		
Amherst	4,518	9	23.89	3	33.3	0	0	0	0	0	4	0	0	0	1	0	555.55	0	0	1	1	0	0	0	0	1	1	0		
Rest of district	.....	119	.....	19	14.5	3	0	4	3	0	1	6	2	1	2	0	136.75	16	18	1	7	4	9	12	8	2	20	6		
Totals for the State	.....	6,606	.....	2,288	34.27	40	1	52	70	0	126	154	41	53	412	89	125.37	1,396	929	95	302	338	437	712	149	190	456	564		

REMARKS. — The total reported mortality for the month is 6,606, the percentage of infant mortality for the State being 34.27. The total number of deaths reported from zymotic diseases is 837, the ratio per thousand deaths from all causes being 125.37, or about one-eighth. The percentage of mortality from croup and diphtheria is 4.67, and from typhoid fever 0.78, the number of deaths from both being considerably less than in January. The continued prevalence of measles is reported from various localities, but the number of deaths for the State is less than for the preceding month, being 2.32 per cent. The principal mortality is from acute respiratory diseases, the percentage being 20.91; from consumption it is 13.91.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of reports of deaths and their causes in the following districts, cities and towns, during March, 1885.

	Population.	Total number of deaths.	Representing annual death rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DISTRICT:																												
NEW YORK CITY	*1,397,395	3,344	28.72	1,327	39.7	27	0	10	37	0	77	119	21	35	190	58	169.56	797	530	51	127	206	184	304	67	93	242	169
BROOKLYN	*665,602	1,312	23.82	520	39.4	0	0	9	15	0	35	24	17	20	68	25	161.24	314	175	32	65	54	73	123	29	47	22	165
Gravesend	*5,000	7	16.60	1	14.3	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	2	1	2	1	1	0	0
New Lots	*17,000	38	25.93	20	52.6	1	0	0	0	0	0	0	0	0	4	0	131.57	5	8	1	5	1	1	3	2	2	0	5
New Utrecht	4,742	17	43.02	7	41.2	0	0	0	0	0	0	1	0	0	0	0	58.82	7	1	1	0	1	1	1	0	1	2	1
Flatlands	3,127	6	23.02	1	16.7	0	0	0	0	0	2	1	0	0	0	0	333.34	1	1	0	0	1	0	0	1	0	1	1
LONG ISLAND CITY	*21,000	42	24.00	12	28.6	0	0	0	0	0	1	1	0	1	0	0	71.43	22	1	0	0	1	0	3	5	1	0	4
Newtown	*10,000	25	30.00	8	32.0	0	0	0	0	0	2	0	0	0	2	1	200.00	5	7	0	0	0	2	2	2	1	1	4
Oyster Bay	*12,000	16	16.00	3	18.7	0	0	0	0	0	1	1	0	0	3	1	125.00	3	0	0	0	1	2	5	1	0	1	1
Hempstead	18,100	18	12.00	6	33.3	0	0	1	0	0	1	1	0	0	2	0	277.78	4	2	0	0	1	1	2	1	0	1	4
North Hempstead	*7,000	15	25.71	3	20.0	0	0	0	0	0	1	0	0	0	1	0	300.00	1	2	0	0	1	0	2	1	1	0	1
Jamaica	10,089	15	17.82	8	53.3	0	0	0	0	0	0	0	0	0	0	0	.....	4	1	0	1	2	4	2	2	1	2	4
Babylon	4,739	14	35.44	4	28.6	0	0	0	0	0	1	0	0	0	0	0	71.43	5	2	0	1	2	0	0	2	3	1	1
Southold	7,267	10	16.51	4	40.0	0	0	0	0	0	0	0	0	0	0	1	100.00	3	2	1	0	0	2	2	0	0	0	1
Southampton	6,352	10	18.89	2	20.0	0	0	1	0	0	0	0	0	0	0	0	100.00	2	1	0	0	0	0	0	0	0	0	1
Northfield	7,014	15	25.71	4	26.7	0	0	0	0	0	2	0	0	0	1	0	200.00	2	2	0	0	2	0	1	3	0	0	1
Westfield	5,289	6	13.61	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	2	0	1	2	0	0	1	2
YONKERS	*22,000	5	19.09	14	40.0	0	0	0	1	0	0	0	1	0	1	0	85.72	12	6	0	3	1	2	3	1	0	0	3
Westchester	*6,900	7	12.18	1	14.3	0	0	0	0	0	0	0	0	0	1	0	142.86	4	2	0	3	1	0	0	0	0	0	0
Rye	*7,500	7	11.20	0	.....	0	0	0	1	0	0	0	0	0	0	0	142.86	3	0	0	1	1	0	1	0	0	0	0
Sing Sing	*6,500	14	25.84	5	35.7	0	0	0	0	0	0	0	0	0	0	0	.....	1	3	0	0	1	2	2	2	0	0	3
Rest of district	.....	50	.....	9	18.0	0	0	0	2	0	0	2	1	0	2	2	180.00	9	6	0	1	2	5	10	0	0	6	2
HUDSON VALLEY DIST.:																												
ALBANY	*99,435	154	18.58	55	35.7	2	0	6	0	0	0	6	0	0	5	4	149.35	27	19	1	8	10	3	36	3	3	4	17
COHOES	*20,000	40	24.00	19	47.5	0	0	2	1	0	0	0	1	0	1	2	200.00	5	5	0	1	2	4	5	1	2	0	7
West Troy	*13,600	26	24.00	8	30.8	0	0	1	0	0	0	0	1	0	0	0	76.92	8	3	0	4	0	4	3	0	0	0	2
TROY	*60,000	129	25.80	45	34.7	0	0	0	0	0	2	0	3	0	5	0	77.50	29	31	0	7	5	10	29	3	0	4	2
Lansingburgh	*8,500	23	32.47	9	39.1	0	0	2	0	0	0	0	0	0	3	1	217.39	2	6	0	2	1	0	5	0	0	0	1
Green Island	*5,000	8	19.20	3	37.5	0	0	0	0	0	0	0	1	0	1	0	125.00	2	1	0	0	1	0	0	0	0	2	1
Greenbush	*7,200	17	23.05	6	35.3	2	0	0	1	0	0	0	0	0	1	0	235.30	1	4	0	1	0	1	3	0	2	1	0

| | | |

	Population.	Total number of deaths.	Representing annual death rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
SOUTHERN TIER DIST.:																												
ELMIRA	*25,000	24	11.52	4	16.7	0	0	1	0	0	0	0	0	0	1	0	83.33	3	6	2	3	1	1	5	0	1	0	0
Horseheads	3,500	3	10.29	0	.....	0	0	0	0	0	0	0	0	2	0	0	.....	2	1	0	1	0	2	1	0	1	0	1
Hornellsville	*10,000	10	12.00	4	40.0	0	0	0	0	0	0	0	0	0	0	0	200.00	2	1	0	1	0	2	0	0	1	0	1
Bath	7,400	11	17.84	2	18.2	0	0	0	0	0	0	0	0	0	0	0	.....	2	0	0	0	0	2	3	0	1	1	2
Olean	8,000	2	3.00	1	50.0	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	0	0	0	0	0	0	1	1
Jamestown	*12,000	16	16.00	2	12.5	0	0	0	0	0	0	0	0	0	0	0	.....	6	4	0	0	0	2	2	0	0	1	1
Westfield	3,500	3	10.28	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	0	0	1	0	0	0	1	0
Rest of district	.....	37	.....	6	16.2	0	0	0	0	0	1	0	2	0	1	0	108.11	11	5	0	0	1	0	9	0	0	4	3
EAST CENTRAL DIST.:																												
Walton	3,541	5	16.94	1	20.0	0	0	0	0	0	0	0	0	0	0	0	.....	1	1	0	0	1	1	0	0	0	1	0
Delhi	3,000	9	36.00	1	11.1	0	0	0	0	0	0	0	0	0	2	0	333.33	2	0	0	0	0	1	0	0	1	2	2
Cooperstown	*3,000	3	12.00	0	.....	0	0	0	0	0	0	0	0	0	1	0	333.33	0	0	0	0	0	2	0	0	0	0	1
Oneonta	*7,000	15	25.71	3	20.0	0	0	0	0	0	0	0	1	0	0	0	66 67	6	1	0	1	2	2	1	0	0	0	0
Worcester	*3,000	1	4.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	1	0	0	0	1
Brookfield	3,685	11	35.82	3	27.3	0	0	0	0	0	0	0	0	0	1	1	181.82	5	0	0	0	0	1	2	0	0	1	0
Baldwinsville	*3,000	4	16.00	1	25.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	2	0	0	0	0	1	0	0	1	0
SYRACUSE	*65,000	81	14.95	15	18.5	0	0	1	0	0	0	0	1	0	4	0	74.07	18	11	1	4	1	7	14	3	4	8	4
Geddes	7,000	2	3.43	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	1	0	0	0	0
Homer	3,500	10	34.28	3	36.0	0	0	0	0	0	0	0	0	0	1	0	100.00	2	1	0	1	0	0	1	0	0	0	4
Rest of district	.....	110	.....	15	13.7	2	0	2	0	0	0	2	0	0	3	0	81.81	27	11	2	2	8	10	18	6	0	9	8
WEST CENTRAL DIST.:																												
AUBURN	*26,000	31	11.92	4	13.3	0	0	0	0	0	0	0	0	0	0	2	64.52	8	9	0	2	2	0	2	1	1	2	2
Groton	3,450	2	6.95	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	1	1	0	0	0	0	0	0
Ithaca	11,198	11	11.79	0	.....	0	1	0	0	0	0	0	0	0	0	0	90.91	3	2	0	1	1	2	0	0	0	2	0
Waterloo	*4,500	7	18.67	2	28.6	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	1	0	2	1	0	0	0	2
Seneca Falls	6,853	5	8.76	2	40.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	2	0	0	0	0	1	0	1	0	2
Hector	5,025	4	9.60	1	25.0	0	0	0	0	0	1	0	0	0	0	0	250.00	1	0	0	0	0	1	1	0	0	0	0
Manchester	*4,000	7	.....	1	14.3	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	0	0	2	2	0	0	2	0
Phelps	*7,000	4	6.86	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	2	0	0	0	0	1	1	0	0	0	0
Geneva	*6,000	13	26.00	1	7.7	0	0	0	0	0	0	0	0	0	0	0	.....	1	1	0	2	0	1	2	0	1	3	1
Dansville	*3,700	9	29.19	2	22.2	0	0	0	1	0	0	0	0	0	0	0	111.11	1	3	0	0	0	0	2	0	0	1	1
Lima	*2,800	1	4.29	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0
Rest of district	.....	109	.....	16	14.7	0	0	3	0	0	0	0	2	0	1	1	64.22	17	12	2	3	7	10	12	3	1	20	10

LAKE ONTARIO & WESTERN DISTRICT:																															
OSWEGO	*24,000	38	19.00	14	36.8	0	0	2	0	0	0	1	0	2	0	0	131.58	4	4	2	1	5	5	4	0	1	4	3			
Fulton	*5,000	7	16.80	1	14.3	0	0	0	0	0	0	0	1	0	0	0	166.67	0	1	0	0	1	2	0	0	0	1	0	1	2		
Lyons	*6,000	5	10.00	1	20.0	0	0	0	0	0	0	0	0	0	0	0	.....	1	1	0	0	1	0	0	0	0	0	0	2	2		
Arcadia	5,702	10	21.00	0	.....	0	0	0	0	0	0	0	1	0	0	0	100.00	3	2	2	0	1	0	0	0	1	0	0	1	1		
Palmyra	*4,800	8	20.00	2	25.0	0	0	0	0	0	0	0	0	0	0	0	.....	3	0	0	0	1	0	0	0	0	0	0	2	0		
Wolcott	3,753	6	19.18	2	33.3	0	0	0	0	0	0	0	0	0	0	1	166.67	1	1	0	1	0	0	1	0	0	0	2	0			
ROCHESTER	*101,000	161	19.13	52	32.4	0	0	1	2	0	1	1	0	0	7	2	86.95	27	18	4	10	12	14	25	6	4	5	22			
Brockport	*4,500	9	24.00	3	33.3	0	0	0	0	0	0	1	2	0	1	0	444.44	1	1	0	1	0	0	0	0	0	0	0	1			
Greece	*5,000	5	12.00	1	20.0	0	0	0	2	0	0	0	0	0	0	0	400.00	1	0	1	0	0	0	0	0	0	0	0	0	0		
Mendon	3,200	4	15.00	1	25.0	0	0	1	0	0	0	0	0	0	0	0	250.00	2	1	0	2	0	0	0	0	0	0	0	0	0		
Brighton	3,736	5	16.06	1	20.0	0	0	0	0	0	0	0	0	0	0	0	.....	2	1	2	0	0	0	0	0	0	0	0	0	0		
Ogden	*3,000	8	32.00	2	25.0	0	0	0	0	0	0	0	0	0	0	0	.....	1	2	0	0	0	2	2	0	0	1	1	0	0		
Albion	*5,000	7	16.80	2	28.6	0	0	0	0	0	0	0	0	0	1	0	142.86	1	1	0	0	0	0	0	0	0	0	0	0	0		
LOCKPORT	*5,000	7	16.80	2	28.6	0	0	0	0	0	0	0	0	0	0	0	.....	1	4	0	0	0	2	0	0	0	0	0	0	0		
Tonawanda	*16,000	13	9.75	1	7.7	0	0	0	0	0	0	0	0	0	0	0	.....	2	0	0	2	0	0	0	0	0	0	1	1	2		
Amherst	4,900	6	14.70	3	50.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	1	0	0	0	0	2	14			
Rest of district	4,518	5	13.28	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0	0	0		
	.....	124	.....	31	25.2	2	0	2	1	0	1	2	2	2	2	1	121.95	19	12	2	7	4	13	13	6	3	16	14			
Totals for the State	.....	7,391	.....	2,561	34.6	40	0	60	71	0	135	180	63	67	352	113	146.08	1,684	1,083	118	329	368	481	812	165	200	467	603			

REMARKS.—The total reported mortality for the month is 7,400, being an excess of 724 deaths over the number reported in the February bulletin. The percentage of infant mortality is 34.27, about the same as that of last month. The total number of deaths from zymotic diseases is 1,081, making a percentage of the total mortality of 14.60. The percentage of mortality from acute respiratory diseases is 22.76; from consumption it is 14.61. Since the February bulletin was issued, 167 delayed returns of deaths for that month have been received, of which the mortality under five years is 57.

a Number of deaths in April, 16; *b* Number of deaths in February, 14; from zymotic diseases, 6.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of reports of deaths and their causes in the following districts, cities and towns, during April, 1885.

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DISTRICT:																												
NEW YORK CITY	*1,397,395	3,097	26.46	1,197	38.7	10	0	14	33	0	77	98	12	26	181	66	166.93	675	475	38	130	240	226	269	0	115	229	183
BROOKLYN	*665,602	1,272	22.95	485	38.2	0	0	7	15	0	40	35	11	15	57	15	157.23	315	190	23	56	58	60	136	26	30	31	152
Gravesend	*5,000	8	19.20	2	25.0	0	0	0	0	0	0	0	0	0	0	0	.....	2	2	0	0	0	0	2	0	2	0	0
New Lots	*17,000	31	20.66	11	35.4	0	0	0	0	0	0	0	0	0	1	1	32 25	6	4	1	0	3	2	7	2	1	1	3
New Utrecht	4,742	7	17.71	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	0	2	0	2	1	0	0	0
Flatlands	3,127	6	23.02	3	50.0	0	0	1	0	0	1	1	0	0	0	0	500.00	0	0	0	0	0	1	0	1	1	1	0
LONG ISLAND CITY	*21,000	28	16.00	17	60.7	2	0	0	2	0	2	2	0	2	1	0	392.87	11	0	0	2	0	1	0	1	3	1	0
Newtown	*10,000	24	28.80	6	25.0	0	0	0	0	0	1	0	0	0	1	0	83.33	4	4	0	1	1	1	3	0	0	1	0
Oyster Bay	*12,000	20	20.00	8	40.0	1	0	0	0	0	0	0	0	0	2	0	150.00	5	1	0	4	1	0	0	0	0	3	5
Hempstead	18,160	18	12.00	5	27.8	0	0	0	0	0	2	0	1	0	0	0	166.67	4	3	1	1	0	0	1	0	1	3	2
North Hempstead	*7,000	15	25.71	2	13.3	0	0	0	0	0	0	0	0	0	0	0	.....	7	1	2	2	0	1	1	0	0	2	0
Jamaica	10,089	18	21.40	9	50.0	1	0	0	0	0	1	0	0	0	2	0	277.78	5	1	0	1	1	0	1	0	0	0	3
Babylon	4,739	a14	35.44	2	14.3	0	0	0	0	0	0	0	0	0	0	1	71.43	4	3	0	3	0	0	1	0	0	0	1
Southold	7,267	7	11.56	2	28.6	0	0	0	0	0	0	0	0	0	0	0	285.71	0	1	0	1	0	0	0	0	0	1	1
Southampton	6,352	12	22.67	5	41.7	0	0	0	0	0	0	1	0	0	1	0	250.00	2	1	0	0	0	0	1	0	0	0	1
Northfield	7,014	10	17.10	2	20.0	0	0	0	0	0	0	0	0	0	2	0	200.00	2	0	0	0	0	2	2	1	1	0	0
Westfield	5,289	12	27.22	1	8.3	0	0	0	1	0	2	0	0	0	0	0	250.00	3	1	1	0	0	2	1	1	0	0	0
YONKERS	*22,000	36	19.64	7	19.4	0	0	0	1	0	0	0	0	0	0	1	55.56	3	6	0	1	6	1	6	1	1	1	2
Westchester	*6,000	7	12.17	4	57.1	0	0	1	0	0	0	0	0	0	3	0	571.43	0	0	0	0	0	0	0	1	0	1	2
Rye	*7,500	6	9.60	2	33.3	0	0	0	0	0	1	0	0	0	0	0	166.67	1	2	0	0	1	0	0	0	0	0	0
Sing Sing	*6,500	12	22.15	2	16 7	0	0	0	0	0	1	0	0	0	0	0	83.33	1	1	0	0	0	4	2	0	2	1	0
Rest of district	.....	52	.....	11	21.1	2	0	0	1	0	0	6	0	0	2	1	230.77	10	10	0	3	2	1	5	0	2	3	4
HUDSON VALLEY DIST:																												
ALBANY	*95,000	163	20.59	44	27.0	0	0	4	1	0	0	9	0	0	5	1	123 70	28	35	0	7	5	14	22	7	5	7	23
COHOES	*20,000	38	22.80	22	57.9	1	0	0	0	0	0	0	0	0	3	0	105.26	8	9	1	0	1	1	5	0	2	0	7
West Troy	*13,000	17	15.69	2	11.8	0	0	1	0	0	0	0	0	0	0	0	58.82	5	2	0	1	1	2	4	0	0	1	0
Hoosic Falls	*4,000	11	33.00	4	36.4	0	0	1	0	0	0	0	0	0	0	0	90.91	3	2	0	1	1	0	1	0	0	1	0
TROY	*60,000	145	29.00	30	20.6	0	0	5	0	0	0	1	0	0	1	0	47 58	45	16	0	5	6	17	34	5	2	8	0
Lansingburgh	*8,500	14	19.76	3	21.4	0	0	0	0	0	0	1	0	0	0	0	71.43	1	3	0	4	1	4	0	0	0	0	0
Green Island	*5,000	8	19.20	3	37.5	1	0	1	0	0	0	0	0	0	0	0	250.00	0	2	0	0	0	0	2	0	0	0	2

Greenbush	*7,200	12	20.00	4	33.3	0	0	1	0	0	0	0	0	0	0	0	0	83.33	2	2	0	1	0	2	1	0	1	1	1	0	0
Catskill	*4,500	4	10.67	2	50.0	0	0	0	0	0	0	0	1	0	0	0	0	250.00	1	0	0	0	0	1	1	0	0	0	1	0	1	0
HUDSON	*10,000	26	31.20	3	11.5	0	0	0	0	0	0	0	1	0	0	0	0	38.46	5	8	2	0	2	1	2	2	1	1	1	0	1	0
KINGSTON	20,000	21	12.60	6	28.6	1	0	0	1	0	0	0	0	2	1	0	0	238.10	2	2	2	2	1	3	1	0	1	2	0	0	0	0
Wawarsing	*8,547	8	11.23	2	25.0	0	0	0	0	0	1	0	0	0	0	0	1	250.00	3	0	0	0	0	2	1	0	0	0	0	0	0	0
Rosendale	5,000	4	9.60	2	50.0	0	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	0	0	1	1	0	0	0	1	0	0	0
Marbletown	4,000	2	6.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	1	1	0	0	0	0	1	0	0
Esopus	4,736	9	22.80	2	22.2	0	0	0	0	0	0	0	0	1	0	0	0	111.11	4	0	0	0	0	0	0	0	0	0	0	1	0	3
Saugerties	*4,000	1	3.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0	0	0	0
POUGHKEEPSIE	20,207	42	24.95	8	19.0	0	0	3	1	0	0	1	0	0	0	2	166.67	2	7	0	5	1	2	7	2	2	4	3	1	3	1	3
Fishkill	10,732	9	10.06	3	33.3	0	0	1	0	0	0	0	0	0	0	0	0	111.11	4	2	0	0	0	0	1	0	0	0	0	1	0	0
Wappinger's Falls	*5,000	7	16.80	0	.....	0	0	0	0	0	0	0	0	0	0	0	0	.....	1	4	0	0	1	0	1	0	0	0	0	0	0	0
NEWBURGH	*20,000	31	18.60	6	19.4	0	0	0	1	0	0	0	0	0	1	0	0	64.51	6	6	2	1	0	1	5	3	1	2	4	0	2	0
Fort Jervis	*8,800	18	24.54	7	38.9	0	0	1	0	0	0	0	0	1	0	0	0	111.11	2	5	0	0	0	0	2	0	0	3	0	0	4	0
Middletown	*10,000	14	16.80	4	28.6	0	0	0	0	0	0	0	0	0	0	0	0	.....	3	5	0	1	1	2	2	0	0	0	0	0	0	0
Goshen	4,387	8	21.88	1	12.5	0	0	0	0	0	0	0	0	1	0	0	0	125.00	2	1	0	0	1	0	1	0	0	0	0	2	0	0
Haverstraw	7,000	12	20.57	5	41.7	0	0	0	0	0	0	0	0	0	0	0	0	.....	4	1	0	1	0	1	2	0	0	0	1	0	2	2
Ramapo	5,000	7	16.80	1	14.3	0	0	0	0	0	0	0	0	0	0	1	0	142.86	2	1	0	0	0	0	0	0	0	0	1	0	1	2
Rest of district	.....	189	.....	30	15.8	0	0	5	5	3	4	6	1	0	2	5	148.15	33	22	2	12	7	12	26	1	4	32	10				
ADIRONDACK & NORTHERN DISTRICT:																																
Argyle	3,700	4	12.98	0	.....	0	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	1	0	2	0	0	0	0	0	0	0	0
Greenwich	3,861	3	9.32	0	.....	0	0	0	0	0	0	0	0	0	0	0	0	.....	2	0	0	0	0	0	0	0	0	0	0	1	0	0
Fort Ann	3,262	5	18.39	1	20.0	1	0	0	0	0	0	0	0	0	0	0	0	200.00	1	0	0	0	0	1	0	0	0	0	0	1	3	1
Fort Edward	4,680	13	33.33	3	23.0	0	0	2	0	0	0	0	0	1	0	0	0	230.77	1	3	0	0	0	1	3	0	0	0	0	1	2	0
Queensbury	*10,000	9	10.80	3	33.3	0	0	0	0	0	0	0	0	1	0	0	0	111.11	3	0	0	1	0	0	1	1	0	0	0	0	2	0
Crown Point	4,287	2	5.59	1	50.0	0	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	0	0	0	1	1	0	0	0	0	0	0
Moriah	7,379	15	24.40	4	26.6	0	0	0	0	0	0	0	0	0	1	0	0	66.66	4	3	0	0	1	1	0	0	1	3	0	2	1	4
Malone	7,908	15	22.78	5	33.3	0	0	0	0	0	0	1	0	0	0	2	0	333.33	2	0	0	1	0	2	2	0	0	0	0	2	1	0
OGDENSBURGH	*10,400	16	18.46	4	25.0	0	0	0	0	0	0	0	0	0	1	0	0	62.50	1	7	0	1	0	1	2	0	0	0	0	1	0	2
Gouverneur	*5,000	13	31.20	6	46.1	0	0	0	0	0	0	1	0	0	0	3	0	307.69	2	3	1	0	1	0	1	0	0	0	0	1	0	0
Ellisburgh	4,812	5	12.54	0	.....	0	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	1	0	1	1	0	0	1	0	0	2	0
WATERTOWN	*13,000	9	8.31	2	22.2	0	0	0	0	0	0	0	0	0	0	0	0	.....	1	1	0	0	1	0	4	0	0	0	0	2	0	0
Cape Vincent	3,143	3	11.45	1	33.3	0	0	0	0	0	0	0	0	0	0	0	0	.....	2	0	0	0	0	1	0	0	0	0	0	1	0	0
Rest of district	.....	122	.....	29	24.6	0	0	1	0	0	1	0	0	1	4	5	92.80	16	20	2	7	2	13	11	3	5	16	15				
MOHAWK VALLEY DIST:																																
SCHENECTADY	*15,000	32	23.60	6	18.7	1	0	2	0	0	0	0	0	0	0	0	0	93.75	3	4	0	4	3	6	7	0	0	0	0	2	0	0
Cobleskill	3,371	1	3.56	0	.....	0	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	1	0	0	0	0	0	0	0
Middleburgh	3,376	10	35.55	0	.....	0	0	0	0	0	0	0	0	1	0	0	0	100.00	2	0	0	0	0	0	1	0	0	0	0	3	0	2
AMSTERDAM	*13,000	14	12.92	6	42.8	0	0	0	0	0	0	0	0	0	1	1	0	142.86	2	1	1	2	0	0	4	0	0	1	0	1	1	0
Johnstown	*6,000	6	12.60	1	16.7	0	0	0	0	0	0	0	0	0	0	0	0	.....	0	2	0	1	0	0	2	1	0	0	0	0	0	3
Gloversville	*8,000	10	15.60	6	60.0	1	0	0	0	0	0	0	3	0	0	0	0	400.00	0	0	0	0	1	1	1	0	0	1	0	0	1	0
Little Falls	*7,300	10	16.44	0	.....	0	0	0	1	0	0	0	0	0	0	0	0	100.00	0	2	0	0	1	0	1	1	0	0	1	3	1	6
Ilion	*4,500	7	18.67	0	.....	0	0	0	0	0	0	0	0	0	0	0	0	.....	1	2	0	0	1	1	1	0	0	1	0	1	3	2
UTICA	*39,000	51	15.64	15	29.4	1	0	1	0	0	0	0	0	0	0	3	0	98.04	10	9	0	2	2	3	13	2	0	1	4	3	2	0
ROME	12,045	24	24.00	7	29.1	0	0	0	0	0	0	0	3	1	0	0	0	166.67	1	4	0	3	0	1	5	0	0	0	1	4	0	1
Boonville	4,000	5	15.00	1	20.0	0	0	0	0	0	0	0	0	0	0	1	0	200.00	0	0	0	2	0	1	0	0	1	0	0	1	0	0
Camden	3,400	4	14.12	0	.....	0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	1	0	0	1	1	1	1	0
Waterford	4,328	9	24.95	5	55.5	0	0	1	0	0	0	0	0	0	0	1	0	222.22	1	0	0	0	0	0	4	0	0	1	0	1	0	4
Milton	5,565	8	17.25	1	12.5	0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	1	0	0	1	0	0	0	0	0	0	0
Saratoga Springs	*10,600	18	21.60	3	16.7	0	0	0	0	0	0	0	0	0	0	5	0	277.78	2	3	0	0	3	1	3	0	0	2	1	1	0	4
Rest of district	.....	76	.....	20	26.3	1	0	0	0	0	0	3	0	0	2	0	78.95	13	11	0	4	2	6	8	2	3	10	11				

a Three in public institutions.

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
SOUTHERN TIER DIST:																												
BINGHAMTON	*20,000	36	21.60	7	19.4	1	0	1	2	0	1	0	0	0	2	2	250.00	7	2	2	3	3	2	3	0	2	1	2
Candor	4,323	6	16.65	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	2	1	1	2	0	0	1	1
ELMIRA	*25,000	27	12.96	8	29.6	0	0	0	0	0	0	0	0	0	1	0	37.04	4	4	0	2	1	1	8	1	2	3	1
Hornellsville	*10,000	5	6.00	1	20.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	2	0	0	0	1	1	0	0	0	0
Bath	7,400	8	13.00	0	.....	0	0	1	0	0	0	0	0	0	1	0	250.00	1	2	1	0	0	1	0	0	0	1	1
Olean	8,000	8	12.00	4	50.0	0	0	0	0	0	0	4	0	0	0	1	500.00	1	0	1	1	0	0	0	0	0	1	1
Jamestown	*12,000	10	10.00	3	30.0	0	0	0	0	0	0	0	1	0	0	1	200.00	2	1	0	1	0	1	1	0	1	1	0
Westfield	3,500	4	13.71	1	25.0	0	0	0	0	0	0	0	0	0	1	0	250.00	1	0	0	0	0	1	1	0	1	0	0
Rest of district	.....	25	.....	2	8.0	1	0	1	0	0	0	0	1	0	0	0	125.00	4	7	0	1	1	0	3	0	4	2	0
EAST CENTRAL DIST:																												
Franklin	*3,000	4	16.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	1	1	0	2	0
Delhi	3,000	3	12.00	0	.....	0	0	0	0	0	0	1	0	0	0	0	333.33	1	0	0	0	0	0	1	0	0	1	0
Walton	3,511	3	10.17	1	33.3	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	1	0	0	1	0	0	0	0
Cooperstown	*3,000	1	4.00	1	100.0	0	0	0	0	0	0	0	0	0	1	0	1000.00	0	0	0	0	0	0	1	0	0	0	0
Oneonta	*7,000	8	13.71	1	12.5	0	0	1	0	0	0	0	0	0	0	0	125.00	2	1	0	0	0	1	1	0	0	1	1
Worcester	*3,000	2	8.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	1	1	0	0	0	0
Brookfield	3,685	3	9.77	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	1	1	0	0	0	0
Baldwinsville	*3,000	1	4.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	1	0	0	0	0
SYRACUSE	*65,000	107	19.75	22	20.6	0	0	1	1	1	0	2	2	0	3	1	102.80	14	18	2	8	4	10	13	2	8	9	8
Skaneateles	4,866	6	14.79	2	33.3	0	0	0	0	0	0	0	0	0	1	0	166.67	1	1	0	1	1	0	0	0	0	0	1
Homer	3,500	4	13.71	1	25.0	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	0	0	0	0	0	0	2	1
Rest of district	.....	106	.....	15	14.3	0	0	2	1	0	0	6	1	0	6	0	152.38	17	14	2	3	2	7	9	2	3	19	12
WEST CENTRAL DIST:																												
AUBURN	*26,000	27	12.46	3	11.1	1	0	0	1	0	0	0	0	0	0	0	74.07	4	2	0	8	2	3	5	0	0	1	0
Ithaca	*10,000	12	14.40	2	16.7	0	0	2	0	0	0	0	0	0	1	0	250.00	2	2	0	0	0	0	1	0	0	3	1
Waterloo	*4,500	5	13.34	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	2	0	0	0	1	0	1	0	0	1	0
Seneca Falls	6,853	4	7.00	1	25.0	0	0	0	0	0	0	0	0	0	1	0	250.00	0	0	0	0	0	2	0	0	0	0	1
Hector	5,025	4	9.60	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	2	0	0	0	0	0	0	0	1	0
Manchester	*4,000	2	6.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	1	0	0	0	0	0
Phelps	*7,000	2	3.43	1	50.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	2	0	0	0	0
Canandaigua	6,300	10	19.05	1	10.0	0	0	0	0	0	0	0	0	0	0	0	.....	2	1	0	0	1	0	3	0	1	0	2
Geneva	*6,000	8	16.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	4	0	2	1	0	0	0	0	1	0

Penn Yan	*4,500	9	24.00	1	11.1	0	0	0	0	0	0	0	1	0	0	0	111.11	1	2	0	2	0	1	0	0	0	1	1	0
Lima	*2,800	3	12.86	1	33.3	0	0	0	0	0	0	0	0	0	2	0	.....	2	0	0	0	0	0	0	0	0	0	1	0
Rest of district	.....	114	.....	13	11.4	1	0	1	3	0	1	1	2	1	1	2	114.04	13	15	2	10	1	11	16	1	6	18	8	
LAKE ONTARIO & WESTERN DISTRICT :																													
OSWEGO	*24,000	28	14.00	5	18.9	0	0	2	1	0	0	1	0	0	0	0	142.85	3	6	2	0	1	2	2	0	1	4	3	
Fulton	*4,000	7	21.00	0	.....	0	0	0	0	0	0	0	1	0	0	0	142.86	0	1	0	0	0	0	2	0	1	1	1	
Lyons	*6,000	18	36.00	4	22.2	0	0	0	0	0	0	0	0	1	0	0	55.55	2	2	0	2	0	0	2	3	0	2	4	
Arcadia	5,702	10	21.05	1	10.0	1	0	0	1	0	0	0	0	0	0	0	.....	0	3	0	0	0	1	1	1	1	1	0	
Palmyra	*4,800	8	20.00	1	12.5	0	0	0	0	0	0	0	0	0	0	0	.....	2	2	0	0	0	1	1	1	0	1	0	
Wolcott	3,753	5	16.00	3	60.0	0	0	0	0	0	0	3	0	0	0	0	600.00	1	1	0	0	0	0	0	0	0	0	0	
ROCHESTER	*101,000	153	18.17	39	25.5	0	0	2	0	0	1	0	3	0	13	0	124.18	21	22	2	14	8	8	26	7	5	8	13	
Brockport	*4,500	3	8.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	2	0	0	0	0	0	0	0	0	1	0	
Mendon	3,200	5	18.75	1	20.0	1	0	0	0	0	0	0	0	0	0	0	200.00	1	0	0	1	0	0	0	0	0	2	0	
Brighton	3,736	a9	26.20	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	2	2	0	0	1	1	2	0	0	1	0	
Albion	*5,000	5	12.00	0	.....	0	0	0	0	0	0	0	1	0	0	0	200.00	0	0	0	0	1	1	0	0	1	0	1	
LOCKPORT	*16,000	16	12.00	3	18.8	0	0	0	0	0	0	0	0	0	0	0	.....	0	4	0	0	0	3	0	0	1	4	4	
Tonawanda	4,900	5	12.41	0	.....	0	0	1	0	0	0	0	0	0	0	0	200.00	2	0	0	0	0	1	0	0	1	0	1	
Amherst	4,518	6	16.00	3	50.0	0	0	0	0	0	1	0	0	0	1	0	333.33	2	0	0	0	0	1	0	0	0	2	1	
Rest of district	.....	110	.....	16	15.7	1	0	0	2	0	0	3	0	1	3	0	98.04	13	16	2	5	4	8	11	2	1	22	16	
Totals for the State	.....	7,016	.....	2,275	32.5	31	0	68	75	1	141	191	44	56	326	106	132.55	1,441	1,049	94	347	395	487	761	81	236	522	564	

a Eight deaths occurred in the county hospital.

REMARKS. — For the year completed with the March bulletin the total reported mortality is 77,086, the infant mortality being 37 per cent. The ratio per 1,000 from zymotic diseases is 228.90; from consumption, 141.50; from acute respiratory diseases, 129.00 — in all 50 per cent of the mortality. In 18 cities, of a total population of 2,559,800, the ratio per 1,000 from zymotic diseases is 235.92; from consumption, 145.52; the mortality for the year being 59,859, or 23 38 per 1,000 population. For April the ratio per 1,000 from zymotic diseases is 132.55; from consumption, 132.71; for acute respiratory diseases, 205 71. For March, 291 delayed returns have been received.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of reports of deaths and their causes in the following districts, cities and towns, during May, 1885.

	Population.	Total number of deaths.	Representing annual death rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DISTRICT:																												
NEW YORK CITY	*1,397,395	2,937	25.53	1,110	23.7	22	1	16	36	0	71	84	14	24	181	82	180.79	474	443	36	136	192	151	256	62	163	211	284
BROOKLYN	*665,502	1,205	21.57	429	35.6	1	0	3	14	0	29	40	5	10	50	35	155.02	216	199	21	57	56	56	129	23	54	27	180
Gravesend	*5,000	9	21.60	1	11.1	0	0	0	0	0	1	0	0	0	0	0	111.11	3	0	0	0	0	0	1	0	0	0	4
New Lots	*17,000	25	16.66	9	36.0	2	0	0	0	0	2	0	0	0	0	0	160.00	7	6	0	0	1	0	3	1	0	0	3
New Utrecht	4,742	4	10.12	1	25.0	0	0	0	0	0	1	0	0	0	0	0	250.00	1	1	0	0	0	0	0	0	1	0	0
Flatlands	3,127	2	7.68	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	1	0	0	0	0
LONG ISLAND CITY	*21,000	36	20.57	12	33.3	0	0	0	0	0	0	1	0	1	1	1	111.11	9	1	2	4	2	2	5	2	3	2	0
Newtown	*10,000	12	14.40	4	33.3	0	0	0	0	0	0	0	0	0	2	0	166.67	2	0	0	0	0	1	2	1	0	1	4
Oyster Bay	*12,000	16	16.00	7	.....	1	0	0	0	0	0	0	0	0	0	0	62.50	4	2	0	1	3	1	3	0	1	1	3
Hempstead	18,160	14	9.30	4	28.5	0	0	1	0	0	0	0	0	0	1	0	142.86	2	0	0	3	1	2	1	1	0	1	1
North Hempstead	*7,000	14	24.00	7	50.0	0	0	0	0	0	0	2	0	0	1	0	142.86	5	1	0	1	1	0	3	0	0	1	1
Jamaica	10,089	18	21.40	5	27.8	0	0	0	0	0	0	1	0	0	1	0	111.11	2	2	0	0	2	5	3	0	2	0	0
Babylon	4,739	5	12.66	0	.....	0	0	1	1	0	0	0	0	0	0	0	400.00	0	0	0	0	1	1	1	0	0	0	0
Southold	7,267	9	14.80	2	25.0	0	0	0	0	0	0	2	0	0	0	0	222.22	0	1	0	0	0	1	0	1	2	1	0
Southampton	6,352	6	11.34	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	1	1	1	0	0	3	0
Northfield	7,014	12	20.58	1	8.4	0	0	0	0	0	0	0	0	0	1	0	83.33	2	2	1	2	2	2	1	1	0	0	1
Westfield	5,289	4	9.07	0	.....	1	0	0	0	0	1	0	0	0	0	0	500.00	0	0	1	0	0	3	1	1	0	1	0
YONKERS	*22,000	30	16.36	5	16.6	0	0	0	0	0	0	0	0	0	1	1	33.33	3	4	1	1	3	4	3	2	3	1	3
Westchester	*6,900	8	13.91	2	25.0	1	0	0	0	0	0	0	0	0	1	0	250.00	3	1	0	1	3	0	4	0	0	0	2
Rye	7,500	10	16.00	1	10.0	0	0	1	0	0	0	0	0	0	0	0	100.00	1	0	0	1	0	1	4	0	0	0	1
Sing Sing	*6,500	11	20.31	1	9.0	0	0	0	1	0	0	0	0	0	0	0	90.91	1	3	0	0	1	2	2	0	0	0	1
Rest of district	.....	50	.....	16	32.0	0	0	0	0	0	0	0	0	0	2	1	60.00	12	13	0	1	3	4	4	1	2	3	4
HUDSON VALLEY DIST.:																												
ALBANY	*95,000	177	22.36	62	35.0	2	0	3	0	0	1	14	1	1	8	2	180.79	27	32	1	5	8	17	21	6	3	6	19
COHOES	*20,000	26	15.60	8	30.8	0	0	2	0	0	0	0	0	0	4	0	230.77	2	9	0	1	2	0	1	0	0	1	3
West Troy	*13,000	19	17.54	3	15.8	0	0	1	0	0	0	0	0	0	0	0	52.63	10	1	0	2	0	1	3	1	0	1	0
Hoosick Falls	*4,000	10	12.00	4	40.0	0	0	0	0	0	0	1	0	0	1	0	200.00	1	2	0	0	0	3	1	0	0	0	1
TROY	*60,000	114	22.80	26	22.8	0	0	1	0	0	0	0	0	0	5	0	52.62	28	23	0	5	4	12	29	2	3	2	0
Lansingburgh	*8,500	20	28.23	6	30.0	0	0	0	0	0	0	0	0	0	2	0	100.00	4	4	0	2	1	0	3	0	0	0	4
Green Island	*5,000	12	28.50	2	16.6	1	0	0	0	0	0	0	0	0	0	0	.....	0	4	0	0	1	1	1	0	0	2	2

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MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH — (*Continued*).

	Population.	Total number of deaths.	Representing annual death rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
SOUTHERN TIER DIST.:																												
Candor	4,323	6	16.65	0	.....	0	0	0	0	0	0	0	0	0	1	0	166.67	1	0	0	1	0	0	0	1	0	1	1
ELMIRA	*25,000	27	12.96	7	25.9	0	0	0	0	0	0	0	0	0	0	1	.....	5	2	0	2	0	1	6	2	0	0	7
Horseheads	3,500	6	20.56	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	2	0	1	0	0	0	0	1	0	1
Hornellsville	*10,000	10	12.00	4	40.0	0	0	0	0	0	0	1	0	0	0	0	200 00	3	3	0	0	1	0	0	0	2	0	1
Bath	7,400	11	16.35	1	10.0	0	0	0	0	0	0	0	0	1	0	0	363.64	1	2	0	0	1	0	0	0	2	0	2
Olean	*8,000	17	25.50	8	47.6	1	0	0	0	0	0	3	0	0	2	0	411.77	1	0	0	0	0	2	0	0	3	0	3
Jamestown	*12,000	11	11.00	3	27.3	0	0	0	0	0	0	0	1	0	0	0	90.91	2	0	0	1	0	0	4	0	0	2	0
Westfield	*3,000	2	8.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	500.00	0	2	0	0	0	1	1	0	1	0	0
Rest of district	.....	91	.....	12	13.2	0	0	1	0	0	1	1	1	1	1	1	76 93	13	10	5	6	3	10	11	6	3	9	8
EAST CENTRAL DIST.:																												
Franklin	* 3,000	1	4.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	0	0	0	0	0	0	0	0
Delhi	3,600	2	8.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0
Walton	3,541	5	16.94	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	1	0	0	0	0	0	0	0
Cooperstown	*3,000	1	4.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	1	0	0	1	0	0	0	1
Oneonta	*5,000	8	19.20	2	25.0	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	1	0	0	1	0	0	0	0
Cazenovia	4,363	6	16.50	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	1	0	0	0	0	0	1	0
Baldwinsville	*3,000	0	.....	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	1	0	3	0	0	3	1
SYRACUSE	*65,000	82	15.14	24	29.3	4	0	0	0	0	1	0	0	1	4	0	121.96	12	18	0	3	1	0	3	0	0	5	1
Geddes	7,000	4	6.86	1	25.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	1	0	0	1	0	0	2	0
Rest of district	.....	23	.....	1	4.3	0	0	0	0	0	0	0	0	0	0	0	43.48	4	3	0	2	0	0	1	0	3	4	2
WEST CENTRAL DIST.:																												
AUBURN	*26,000	33	15.23	5	15.2	1	0	1	0	0	0	0	1	0	0	0	90.91	4	9	1	1	0	1	9	3	1	0	1
Ithaca	*10,000	5	6.00	4	80.0	0	0	0	0	0	0	0	0	0	2	0	400.00	0	0	0	0	0	0	1	0	0	0	0
Waterloo	*4,500	10	26.67	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	1	0	0	0	0	1	0	0	0	0
Seneca Falls	6,853	2	3.50	0	.....	0	0	0	1	0	0	0	0	0	0	0	500.00	0	0	0	0	0	0	0	0	0	0	0
Groton	3,450	4	13.91	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	1	0	0	0	0	1	0	0	0	0
Hector	5,025	3	7.20	0	.....	0	0	0	1	0	0	0	0	0	0	0	333.33	1	0	0	1	0	0	0	0	0	2	0
Manchester	*4,000	1	3.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	0	0	0	1	0	0	0	0
Phelps	*7,000	7	12.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	2	0	1	0	0	0	0	0	1	0
Canandaigua	*6,300	1	2.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0
Geneva	*6,000	9	18.00	5	55.5	0	0	0	0	0	0	0	0	0	1	0	222.22	1	2	0	1	0	0	0	0	1	0	0
Attica	3,100	4	15.50	1	25.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	1	0	0	0	0	0	0	0
Penn Yan	*4,500	5	13.33	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	1	0	0	0	0	4	0

Lima	*2,800	4	17.14	2	50.0	0	0	0	0	0	0	0	0	0	3	0	750.00	0	0	0	0	0	0	0	0	0	1	0
Rest of district	.....	76	.....	9	11.8	1	0	2	3	0	0	1	1	0	0	2	131.58	2	16	1	9	3	6	10	3	5	7	4
LAKE ONTARIO & WESTERN DISTRICT:																												
OSWEGO	*24,000	28	14.00	8	28.5	0	0	2	1	0	0	0	0	0	1	0	142.85	6	4	1	1	0	1	4	0	1	3	3
Fulton	*4,000	4	12.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	2	0	0	0	0	0	0	0	0	1
LYONS	*6,000	8	16.00	2	25.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	2	0	2	1	0	3
Arcadia	5,702	10	21.05	1	10.0	0	0	0	1	0	0	0	0	0	0	0	100.00	0	1	1	0	1	1	0	0	2	1	2
Palmyra	*4,800	5	12.50	2	40.0	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	0	0	0	0	0	1	2	1
Wolcott	3,753	4	12.79	1	25.0	1	0	0	0	0	0	0	0	0	0	0	250.00	0	0	0	1	0	0	0	0	0	1	1
ROCHESTER	*101,000	159	18.90	38	23.9	0	0	0	0	0	0	0	6	0	2	1	56.60	24	30	5	9	7	7	27	1	9	3	28
Brockport	*4,500	2	5.33	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	0	0	0	1	0	0	0	0
Mendon	3,200	5	18.75	1	20.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	1	1	0	1	0	0	1	0
Brighton	3,736	7	22.46	0	.....	0	0	1	0	0	0	0	0	0	0	0	142.86	1	1	0	0	0	0	1	0	1	2	0
Albion	*5,000	4	9.60	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	1	0	0	0	2
LOCKPORT	*16,000	13	9.75	2	15.4	0	0	0	0	0	0	0	1	0	0	0	76.92	1	4	0	0	0	0	3	0	0	0	4
Tonawanda	4,900	4	9.80	1	25.0	0	0	0	0	0	0	0	0	0	0	0	.....	2	0	0	1	0	1	0	0	0	0	0
Amherst	4,518	2	5.33	1	50.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	1	0	0	0	0	0	1	0
Hamburg	3,235	7	25.96	1	14.3	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	2	1	0	1	0	1	0	1
Rest of district	.....	116	.....	26	22.8	3	0	2	1	0	5	1	0	1	1	0	122.80	14	16	2	12	3	10	13	8	3	6	15
Totals for the State	.....	6,542	.....	2,094	32.2	53	1	55	74	0	122	165	38	47	319	136	154.70	1,638	1,033	94	331	345	407	707	161	312	387	717

REMARKS.—The total reported mortality for the month is 6,542; the percentage of infant mortality is 32.23 The ratio per 1,000 of deaths from zymotic diseases is 154.70, that from measles being 26.83; from scarlet fever, 18.70, and from croup and diphtheria, 48.91. The ratio per 1,000 of deaths from consumption is 157.77, and from acute respiratory diseases, 158.70. For the month of April the number of delayed returns received since last Bulletin was issued is 160; from Albany 13 additional deaths for April are reported.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of reports of deaths and their causes in the following districts, cities and towns, during June, 1885.

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrheal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrheal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DISTRICT:																												
NEW YORK CITY	*1,397,395	2,824	24.25	1,290	45.7	13	1	17	37	3	53	73	16	22	177	307	254.25	334	376	35	146	173	141	267	67	133	181	251
BROOKLYN	*665,602	1,275	22.84	675	52.9	0	0	4	17	0	33	25	5	10	51	304	273.72	150	138	17	64	51	76	122	24	35	22	127
Gravesend	*5,000	65	12.09	2	40.0	0	0	0	0	0	0	0	0	0	0	1	a200.00	0	0	0	0	0	0	3	0	0	0	1
New Lots	*17,000	53	25.33	14	39.5	0	0	0	0	0	2	0	0	0	1	3	157.89	3	7	0	2	2	1	9	0	1	4	3
New Utrecht	4,742	8	20.24	2	25.0	0	0	0	0	0	0	0	0	0	0	1	125.00	1	1	0	0	1	1	2	0	0	0	1
Flatlands	3,127	5	19.19	4	80.0	0	0	0	0	0	0	0	0	0	0	2	400.00	0	1	0	0	1	0	2	0	0	0	0
Newtown	*10,000	18	21.80	10	55.5	0	0	0	2	0	0	0	0	0	3	2	388.89	0	3	1	0	0	0	3	1	0	0	3
Oyster Bay	*12,000	14	14.00	5	34.3	0	0	1	0	0	0	0	0	0	0	1	142.85	0	1	0	0	0	1	5	1	1	2	6
North Hempstead	*7,000	6	10.29	3	50.0	0	0	0	1	0	0	0	0	0	0	0	166.67	1	0	0	1	0	1	4	0	1	2	3
Jamaica	10,089	15	18.00	3	20.0	0	0	0	1	0	0	0	0	0	0	0	66.67	1	1	0	0	1	0	3	0	2	6	0
Babylon	4,739	2	4.53	1	50.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	2	0	0	2	0	2
Southold	7,267	7	11.54	0	.....	0	0	0	0	0	1	0	0	0	0	0	.....	0	2	0	0	0	3	0	0	0	1	1
New Brighton	.....	a26	.....	5	19.2	0	0	0	0	0	0	0	0	0	1	0	b79.92	2	3	0	3	0	3	6	1	1	2	2
Southampton	6,352	5	9.50	0	.....	0	0	1	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	2	1	0	0	2
Northfield	7,014	2	3.43	0	.....	0	0	0	0	0	0	0	0	0	0	1	500.00	0	0	0	0	0	1	1	0	0	0	0
Westfield	5,289	5	11.80	3	60.0	0	0	0	0	0	0	0	0	0	1	0	200.00	2	0	0	0	0	2	1	0	0	1	0
YONKERS	*22,000	31	16.91	17	54.8	3	0	0	0	0	1	0	1	0	0	6	355.00	0	4	1	0	0	2	6	0	0	1	0
Westchester	*6,000	8	13.91	1	12.5	0	0	0	0	0	0	0	0	0	1	0	125.00	1	2	1	2	0	0	1	0	1	1	1
Mount Vernon	*5,000	10	24.00	9	90.0	0	0	0	1	0	0	0	0	0	0	1	200.00	0	4	1	1	0	0	0	0	0	1	1
Rye	*7,500	3	4.80	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	1	0	0	0	0	0	1	2
Sing Sing	*6,500	9	16.62	2	22.2	0	0	0	0	0	0	0	1	0	0	1	222.22	1	1	0	0	1	0	0	0	1	0	2
Rest of district	.....	81	.....	23	.....	0	0	0	0	0	1	0	0	0	1	1	.....	11	10	1	1	6	7	6	14	2	5	4	12
HUDSON VALLEY DIST.:																												
ALBANY	*95,000	154	19.45	65	42.2	2	0	2	0	0	1	13	0	2	11	8	311.68	9	23	2	4	7	19	10	9	9	4	19
COHOES	*20,000	24	14.40	7	29.2	0	0	1	0	0	0	0	0	0	3	0	125.00	1	5	0	2	1	1	0	2	1	2	6
West Troy	*13,000	16	14.77	5	31.2	0	0	2	0	0	0	0	0	0	0	1	125.00	1	1	0	0	1	3	1	0	1	2	0
Hoosick Falls	*4,000	4	12.00	1	25.0	0	0	0	0	0	0	0	0	0	1	0	250.00	1	1	0	1	0	0	2	0	1	2	0
TROY	*60,000	81	16.20	19	23.5	5	0	2	0	0	0	0	0	0	2	2	148.15	4	16	5	4	7	9	13	0	2	0	0
Lansingburgh	8,500	20	28.23	5	25.0	0	0	0	0	0	0	0	0	0	2	0	200.00	1	1	0	0	3	7	0	1	1	0	1

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MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH — (*Continued*).

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
SOUTHERN TIER DIST.:																												
BINGHAMTON	*20,000	25	15.00	7	28.0	0	0	2	0	0	0	0	0	0	0	2	160.00	0	5	0	1	0	3	2	1	1	0	0
Candor	4,323	1	2.78	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0
ELMIRA	*25,000	12	10.56	3	15.6	0	0	1	0	0	0	0	0	0	0	1	90.90	2	4	0	6	0	1	1	0	1	0	0
Horseheads	3,500	2	6.86	1	50.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0
Hornellsville	*10,000	4	4.80	0	.....	0	0	0	0	0	0	0	0	0	0	0	250.00	0	1	0	0	0	0	0	0	0	0	0
Bath	7,400	10	16.22	2	20.0	0	0	0	0	0	0	0	0	0	0	0	400.00	1	1	0	1	0	0	0	0	0	0	0
Olean	*8,000	13	17.00	6	46.2	0	0	0	0	0	0	0	0	1	0	3	461.54	2	1	0	1	0	1	2	0	1	0	0
Jamestown	*12,000	11	11.00	1	9.1	0	0	0	0	0	0	0	0	0	0	1	181.81	0	3	0	1	0	0	3	1	1	0	0
Westfield	*3,000	2	8.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0
Fredonia	2,800	7	30.00	0	.....	0	0	0	0	0	0	1	0	0	0	0	142.86	0	0	0	1	0	0	1	0	0	0	0
Rest of district	.....	46	.....	3	6.5	0	0	0	0	0	1	0	1	0	0	2	87.39	2	7	3	10	0	2	5	11	2	3	1
EAST CENTRAL DIST.:																												
Franklin	3,000	1	4.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	0	0	0	0	0
Walton	3,541	5	16.94	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	1	0	0	0	1	1	0	0	0	0
Cooperstown	*3,000	5	20.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	0	0	0	0	0
Oneonta	*5,000	2	4.80	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	1	0	0	0	0	0
Worcester	*3,000	1	4.00	1	100.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	1	0	0	0	0	0	0	0
Cazenovia	4,363	3	8.30	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	1	0	0	0	0	0
Brookfield	3,685	2	6.51	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0
Baldwinsville	*3,000	1	4.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	1	0	0	0	0	0
SYRACUSE	*65,000	51	9.42	17	33.3	0	0	0	1	0	1	0	0	0	0	2	98.04	6	7	0	6	0	3	4	1	6	1	0
Geddes	7,000	5	8.57	1	20.0	0	0	0	0	0	0	0	0	1	0	0	200.00	1	1	0	0	0	0	1	0	2	0	0
Homer	*3,500	2	6.86	0	.....	0	0	0	0	0	0	1	0	0	0	0	500.00	0	1	0	0	0	0	0	1	0	1	0
Rest of district	.....	69	.....	11	14.5	1	0	1	1	0	2	0	1	0	1	0	101.45	2	4	0	12	3	10	7	4	5	1	0
WEST CENTRAL DIST.:																												
AUBURN	*25,000	e26	12.00	6	23.1	2	0	0	0	0	0	0	0	0	2	2	e230.77	0	5	0	1	0	3	3	1	1	1	0
Ithaca	*10,000	12	14.40	3	25.0	0	0	0	0	0	0	0	1	0	2	1	166.68	0	2	0	0	0	0	2	1	2	0	0
Waterloo	*4,500	6	16.00	1	16.7	0	0	0	0	0	0	0	0	0	0	0	333.33	0	2	0	0	0	0	0	0	0	0	0
Seneca Falls	6,853	5	8.75	1	20.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0
Hector	5,025	1	2.50	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0
Manchester	*4,000	5	15.00	1	20.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	0	0	0	0	0
Phelps	*7,000	1	1.71	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0

Geneva	*6,000	11	21.00	2	18.2	1	0	0	1	0	0	0	0	0	0	0	0	0	181.82	0	1	0	0	0	2	2	0	1	3	1
Penn Yan	4,500	2	5.33	0	.....	0	0	1	0	0	0	0	0	0	0	0	0	0	500.00	0	0	0	0	0	0	1	0	0	0	0
Lima	*2,800	5	21.43	0	.....	0	0	0	0	0	0	0	0	0	0	1	0	0	200.00	0	0	0	0	1	0	1	1	0	1	0
Rest of district	.....	64	.....	5	7.8	1	0	2	2	0	0	0	1	1	0	1	125.00	6	10	0	2	2	4	12	2	2	9	7	
LAKE ONTARIO & WESTERN DISTRICT:																													
OSWEGO	*24,000	24	12.00	4	16.7	0	0	1	3	0	0	0	0	0	0	0	166.67	1	4	0	0	2	4	3	1	1	1	3	
Fulton	*4,000	2	6.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	1	0	0	0	0	0	0	0	0
Lyons	*6,000	7	14.00	1	14.3	0	0	0	0	0	0	0	0	0	0	1	142.86	1	0	0	1	0	0	1	1	1	1	1	0
Sodus	*4,800	6	13.61	2	33.3	0	0	0	0	0	0	0	0	0	0	1	166.67	0	1	0	0	0	1	0	1	1	1	0	0
Wolcott	3,753	4	12.80	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	1	0	1	1	0	0
ROCHESTER	*101,000	133	15.80	37	27.8	0	0	1	0	0	1	0	1	0	7	3	97.74	12	23	1	7	7	8	27	4	7	3	21	0
Brockport	4,500	5	13.33	1	20.0	0	0	1	0	0	0	0	0	0	0	0	200.00	1	0	0	0	0	0	1	1	0	1	0	0
Greece	3,200	3	7.20	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	1	0	0	1	0	0	1
Brighton	3,736	c2	7.50	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	1	0	0	0	0	0	0	1	1
Albion	*5,000	3	7.50	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	0	0	0	0	1	0
LOCKPORT	*16,000	d2	1.50	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	0	1	0	0	1	1
Tonawanda	4,900	4	9.80	1	25.0	0	0	0	0	0	0	1	0	0	0	0	250.00	0	1	0	0	0	0	0	1	0	0	1	1
Amherst	4,518	6	16.00	1	16.7	0	0	1	0	0	0	0	0	0	0	0	166.67	1	2	0	0	0	1	0	0	0	0	1	1
Aurora	3,000	2	8.00	1	50.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	1	0	0	0	0	0	0	0	1
Hamburg	3,235	5	18.52	1	20.0	0	0	0	0	0	3	0	0	0	0	0	600.00	1	1	0	0	0	0	0	0	0	0	0	1
Rest of district	.....	100	.....	13	13.0	0	0	3	0	0	1	0	0	1	2	2	90.00	8	10	1	7	3	13	15	8	5	11	12	
Totals for the State	.....	6,204	.....	2,483	40.0	37	1	54	74	3	106	128	32	46	319	680	238.55	643	814	78	334	328	432	703	172	277	356	587	

REMARKS.— The total reported mortality for the month is 6,204, the percentage of infant mortality is 40.0. The number of deaths from zymotic diseases is 1,480, the ratio per 1,000 to deaths from all causes being 238.55. The ratio per 1,000 of deaths from diarrhœal diseases, the total mortality from which cause is just five times greater than in May, is 109.61; from croup and diphtheria, 51.42; from acute respiratory diseases, 103.64 per 1,000 deaths occurred, and from consumption 131.20. For the month of May 244 delayed returns have been received since the last Bulletin was issued, 53 of which are under five years of age.

a Seven deaths in public institutions. *b* Six deaths in public institutions. *c* Eight deaths in public institutions. *d* Returns manifestly far from correct. *e* Two deaths in public institutions.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of reports of deaths and their causes in the following districts, cities and towns, during July, 1885.

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DIST.: Totals	.....	6,959	.....	4,216	60.5	19	2	27	67	4	65	66	13	63	199	2617	422.76	373	597	65	462	277	235	718	100	227	252	511
NEW YORK CITY	*1,397,395	4,312	37.03	2,516	68.3	16	2	19	34	2	35	52	8	49	151	1472	426.71	243	401	44	300	192	139	438	66	136	188	325
BROOKLYN	*665,602	2,052	37.00	1,338	65.2	0	0	7	25	0	25	12	3	9	37	898	405.13	113	155	17	106	69	74	231	26	61	35	119
Gravesend	*5,000	027	64.80	33	85.5	0	0	0	1	0	0	0	0	0	1	15	630.00	0	0	0	4	0	1	3	0	1	0	1
New Lots	*18,000	47	29.68	34	72.3	1	0	0	1	1	2	0	0	2	1	18	553.19	0	0	1	2	4	2	2	0	4	2	4
New Utrecht	4,742	15	37.96	6	40.0	0	0	0	0	1	0	1	0	1	0	2	266.67	1	1	0	0	0	0	3	2	2	0	2
Flatlands	3,127	9	34.50	5	55.5	0	0	0	0	0	0	0	0	0	0	3	333.33	0	1	0	0	0	1	0	0	1	0	3
LONG ISLAND CITY	*21,000	64	36.57	36	66.2	0	0	0	0	1	0	0	0	0	2	25	437.60	2	5	0	4	2	3	6	1	3	0	10
Newtown	*10,000	37	44.40	29	78.4	0	0	0	0	0	0	0	0	0	2	16	486.48	1	2	0	0	0	0	3	0	1	2	10
Oyster Bay	*12,000	20	20.00	13	65.0	0	0	0	0	0	0	0	0	0	0	10	500.00	0	3	0	3	0	1	0	0	1	0	2
Hempstead	18,160	17	11.32	8	47.0	0	0	0	0	0	0	0	0	1	0	6	411.75	0	2	0	2	0	1	0	0	1	1	4
North Hempstead	*7,000	19	32.57	11	57.9	0	0	0	0	0	0	0	0	0	0	7	358.00	2	0	0	2	0	1	3	0	2	2	0
Jamaica	10,089	41	48.71	27	65.9	0	0	1	0	0	2	0	0	0	1	23	658.54	0	2	1	0	0	2	1	1	2	3	2
Babylon	4,739	3	7.17	0	.....	0	0	0	0	0	0	0	0	0	1	0	333.33	0	0	0	0	1	0	1	0	0	0	0
Southold	7,267	10	16.51	5	50.0	1	0	0	0	0	0	1	0	0	0	0	200.00	0	0	0	1	0	1	2	1	1	2	1
Southampton	6,352	10	18.89	2	20 0	0	0	0	0	0	0	1	0	0	0	0	100.00	1	0	0	1	2	2	1	0	0	2	0
Northfield	7,014	18	30.79	11	61.1	0	0	0	0	0	0	0	0	0	0	9	500.00	1	1	0	2	0	0	3	0	1	0	1
Westfield	5,289	17	38.11	14	82.4	0	0	0	1	0	0	0	0	0	0	10	616.06	0	3	0	1	1	0	0	0	0	1	0
YONKERS	*22,000	71	38.64	46	64.8	0	0	0	1	0	0	0	0	0	0	36	521.12	0	5	1	1	2	2	6	2	2	2	11
Westchester	*6,900	13	22.61	6	46.1	0	0	0	2	0	0	0	0	0	0	5	539.23	0	0	0	0	1	2	1	0	3	0	2
Mount Vernon	*5,000	520	48.00	9	45.0	0	0	0	0	0	1	0	0	0	0	4	250.00	1	1	0	1	1	0	4	0	0	4	3
Rye	3,500	6	20.57	3	50.0	0	0	0	0	0	0	0	0	0	0	3	500.00	1	1	0	0	0	1	0	0	0	0	0
Sing Sing	*6,500	23	42.46	11	47.9	0	0	0	0	0	0	0	0	0	0	10	434.79	1	2	0	0	0	3	3	0	1	0	3
Rest of district	.....	108	.....	63	58.3	1	0	0	2	0	0	0	1	1	3	45	490.74	6	12	1	3	3	1	8	1	4	8	8
HUDSON VALLEY DIST.: Totals	.....	880	.....	351	40.0	6	..	17	14	..	13	15	...	3	23	172	300.00	34	107	10	52	26	59	123	24	48	53	81
ALBANY	*96,336	194	24.17	91	46.9	0	0	3	1	0	3	9	0	0	10	29	273.19	3	19	0	18	10	14	22	5	16	7	25
COHOES	*20,000	45	27.00	28	62.2	0	0	0	1	0	0	0	0	0	0	15	355.55	0	4	0	2	0	2	8	1	3	3	6
West Troy	*13,000	31	28.61	15	48.4	0	0	0	0	0	1	0	0	0	1	11	419.35	3	1	0	2	0	1	6	0	2	1	2
Hoosac Falls	*4,000	11	33.3	4	36.4	1	0	0	0	0	0	0	0	0	0	1	181.81	0	2	0	1	0	0	4	0	0	0	2
TROY	*60,000	127	25.40	50	39.3	3	0	5	0	0	1	1	0	0	0	31	322.83	7	27	3	7	4	8	15	4	6	3	2

Lansingburgh	*8,500	17	24.00	4	23.5	0	0	1	0	0	1	0	0	0	0	0	3	294.12	1	3	0	1	0	3	0	0	0	3	1	1	0	0	0	0	0	0	0
Green Island	*5,000	8	19.20	5	62.5	0	0	0	0	0	0	0	0	0	0	0	4	500 00	1	0	0	1	0	2	0	0	0	0	1	0	1	0	0	0	0	0	0
Greenbush	7,200	14	33.33	7	50.0	1	0	0	0	0	0	0	0	0	0	0	3	285.71	2	0	0	3	1	0	1	1	0	1	1	0	0	0	0	0	0	0	0
Catskill	*4,500	1	2.67	0	....	0	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HUDSON	*10,000	25	30.00	7	28.0	0	0	0	0	0	1	0	0	0	0	5	3	360.00	1	2	0	1	3	3	2	0	2	0	0	2	0	0	0	0	0	0	2
KINGSTON	20,000	51	30.60	29	56.9	0	0	1	1	0	0	3	0	1	2	17	509.80	4	5	0	2	1	7	3	0	1	3	3	0	0	0	0	0	0	0	0	0
Wawarsing	8,547	9	12.63	4	44.5	0	0	0	0	0	1	0	0	0	0	2	333.33	0	0	0	0	1	0	4	0	0	0	1	0	0	0	0	0	0	0	0	0
Rosendale	*5,000	1	2.40	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Marbletown	4,000	4	12.00	1	25.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Esopus	4,736	4	10.21	3	75.5	0	0	0	0	0	0	0	0	0	0	2	500.00	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Saugerties	*4,000	5	15.00	0	.....	0	0	0	2	0	0	0	0	0	0	0	400.00	0	0	0	0	0	0	0	0	0	0	1	2	1	0	3	0	0	0	0	0
POUGHKEEPSIE	20,207	41	24.30	16	39.0	0	0	1	3	0	0	0	0	0	1	6	268.30	0	5	0	1	0	2	10	2	0	7	3	0	0	0	0	0	0	0	0	0
Fishkill	10,732	12	13.35	2	10 0	0	0	0	1	0	0	0	0	0	0	0	.....	0	2	1	0	0	2	0	0	0	1	2	0	0	0	0	0	0	0	0	0
Wappinger's Falls	*5,000	3	7.20	3	100.0	0	0	0	0	0	2	0	0	0	0	0	666.66	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
NEWBURGH	20,000	38	22.80	21	55.2	0	0	0	1	0	0	1	0	0	0	10	315.79	2	4	0	2	1	1	10	0	3	3	0	0	0	0	0	0	0	0	0	0
Port Jervis	*9,000	14	18.67	2	14.3	0	0	0	1	0	0	0	0	0	0	1	71.43	0	2	0	2	0	1	2	0	1	0	0	0	0	0	0	0	0	0	0	0
Middletown	*10,000	10	12.00	0	.....	0	0	0	0	0	0	0	0	0	0	1	100.00	0	1	0	1	0	1	5	0	1	0	0	0	0	0	0	0	0	0	0	0
Goshen	4,387	7	19.15	1	14.3	0	0	0	0	0	0	0	0	1	0	1	285.71	0	2	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0
Haverstraw	7,000	11	18.83	5	45.5	0	0	0	0	0	0	0	0	0	0	4	363.64	0	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0
Ramapo	*5,000	7	16.80	2	28.6	0	0	1	0	0	0	0	0	0	0	1	285.71	1	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rest of district	.....	190	.....	51	26.8	1	0	4	4	0	3	1	0	1	4	28	242.10	9	25	5	5	5	12	27	10	10	13	23									
ADIRONDACK & NORTHERN DIST.: Totals	.....	158	.....	42	26.6	4	..	1	1	...	1	3	...	5	10	14	246.83	5	21	4	9	7	11	18	7	11	13	13									
Greenwich	3,861	6	18.65	4	66.7	0	0	0	0	0	0	0	0	3	0	1	466.67	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0
Fort Ann	4,267	6	16.87	0	.....	1	0	0	0	0	0	0	0	0	0	1	166.67	0	0	0	0	1	1	0	0	2	0	0	0	0	0	0	0	0	0	1	0
Queensbury	*10,000	14	16.80	6	42.8	0	0	0	0	0	0	0	0	0	0	5	357.14	0	2	0	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0
Crown Point	4,287	2	5.60	1	50.0	0	0	0	0	0	0	0	0	0	0	1	500.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Port Henry	2,525	3	14.26	2	66.6	0	0	0	0	0	0	0	0	0	0	2	666.67	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malone	7,908	4	6.10	2	50.0	0	0	0	0	0	0	0	0	0	1	0	250.00	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OGDENSBURGH	*11,000	16	17.45	2	12.5	1	0	0	0	0	0	0	0	0	0	1	125.00	0	4	0	0	0	4	3	0	0	1	0	0	0	0	0	0	0	0	0	0
Gouverneur	*5,000	7	16.80	2	28.6	1	0	0	0	0	0	0	0	0	2	1	571.43	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plattsburgh	.....	c6	.....	2	33.3	0	0	0	0	0	0	2	0	0	1	0	500.00	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ellisburgh	4,812	4	10.00	1	25.0	0	0	0	0	0	0	0	0	0	0	1	250.00	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
WATERTOWN	*13,000	14	12.92	4	28.6	0	0	0	0	0	0	0	0	0	1	1	142.86	0	3	1	1	1	2	3	0	0	0	1	0	0	0	0	0	0	0	0	0
Cape Vincent	3,143	3	12.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Rest of district	.....	73	.....	16	22.2	1	0	1	1	0	1	1	0	2	3	3	181.40	4	7	3	6	3	2	8	4	6	11	6									
MOHAWK VALLEY DIST.: Totals	.....	252	.....	73	29.0	1	..	3	..	...	1	1	1	...	14	36	226.19	10	34	7	20	7	15	40	9	13	25	15									
SCHENECTADY	*15,000	24	19.20	11	45.8	0	0	2	0	0	1	0	0	0	2	8	541.67	0	6	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cobleskill	3,371	1	3.56	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AMSTERDAM	13,000	24	22.15	16	66.7	0	0	0	0	0	0	1	0	0	0	8	375.00	2	1	1	0	0	0	5	0	2	2	2	0	0	0	0	0	0	0	0	0
Johnstown	*6,000	6	12.00	1	16.7	0	0	0	0	0	0	0	0	0	0	0	.....	1	1	0	0	0	2	1	0	0	0	1	0	0	0	0	0	0	0	0	0
Gloversville	*8,000	7	10.50	2	28.6	0	0	0	0	0	0	0	0	0	0	1	142.86	0	1	0	1	1	0	2	0	0	1	1	0	0	0	1	0	0	0	0	0
Little Falls	*7,300	9	14.80	3	22.2	1	0	0	0	0	0	0	0	0	0	0	.....	1	0	1	0	0	0	2	0	0	3	0	0	0	0	0	0	0	0	0	0
Ilion	*4,500	8	21.33	2	25.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	2	1	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Herkimer	*3,000	3	12.00	1	33.3	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
UTICA	*39,000	62	19.08	15	24.2	0	0	0	0	0	0	0	0	0	0	7	225.80	3	5	0	3	3	5	13	6	3	5	1	0	0	0	0	0	0	0	0	0
ROME	12,045	8	8.00	1	12.5	0	0	0	0	0	0	0	0	0	0	1	125.00	0	1	0	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0
Boonville	4,000	2	6.00	1	50.0	0	0	0	0	0	0	0	0	0	0	1	500.00	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Camden	3,460	4	14.12	1	25.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	1	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0
Waterford	4,328	9	24.95	5	55.5	0	0	0	0	0	0	0	0	0	0	1	2	333.33	0	1	0	1	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0
Milton	5,565	12	25.87	1	8.3	0	0	1	0	0	0	0	0	0	0	0	83.33	0	3	0	2	0	2	0	0	0	3	1	0	0	0	0	0	0	0	0	0

a A large transient population. *b* Deaths in Mt. Vernon Home not included. *c* Not including Plattsburgh village.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH—(*Continued*).

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases:	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MOHAWK VALLEY DIST:																												
Saratoga Springs	*10,000	16	19.20	3	18.8	0	0	0	0	0	0	0	0	0	3	1	250.00	0	4	0	2	1	0	2	1	1	0	1
Mechanicville	*2,500	5	24.00	2	40.0	0	0	0	0	0	0	0	0	0	0	1	200.00	0	2	0	0	0	0	2	0	2	0	0
Rest of district	.....	52	.....	9	17.3	0	0	0	0	0	0	0	0	1	0	6	152.70	3	5	2	4	1	5	8	1	1	10	4
SOUTHERN TIER DIST:																												
Totals	.....	134	.....	43	32.1	1	...	1	1	...	1	3	...	1	3	23	253.73	14	10	4	10	4	6	14	3	13	10	12
BINGHAMTON	*20,000	37	22 20	16	43.2	0	0	1	0	0	0	1	0	0	1	14	459.45	3	3	0	3	0	3	4	0	2	1	1
ELMIRA	*25,000	25	12.00	11	44.0	0	0	0	1	0	0	1	0	0	1	4	280.00	5	3	1	2	0	3	3	0	1	1	2
Hornellsville	*10,000	7	8 40	1	14.3	0	0	0	0	0	0	0	0	0	0	2	285.71	0	0	0	0	0	0	0	1	1	2	1
Bath	7,400	7	11.35	1	14.3	1	0	0	0	0	0	0	0	0	0	0	142.85	0	0	1	0	1	0	0	1	0	2	2
Olean	*8,000	10	15.00	2	20.0	0	0	0	0	0	1	0	0	0	0	2	300.00	1	1	0	1	0	1	0	1	0	1	1
Jamestown	*12,000	12	12.00	3	25.0	0	0	0	0	0	0	0	0	0	0	0	.....	2	2	1	3	1	0	1	1	2	1	0
Westfield	*3,000	2	8.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	1	0	1	0	0	0
Fredonia	28,000	5	21.43	2	40.0	0	0	0	0	0	0	1	0	0	0	1	400.00	0	0	0	0	0	1	0	1	0	0	2
Rest of district	.....	29	.....	7	24.1	0	0	0	0	0	0	0	0	1	1	0	68.96	3	1	1	1	2	1	5	0	6	3	4
EAST CENT. DIST: Totals	.....	181	.....	52	28.7	2	...	7	2	...	...	...	...	1	...	20	176.80	5	24	...	15	4	18	23	8	13	13	26
Franklin	*3,000	2	8.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	1	1	0	0	0	1
Delhi	3,000	1	4.00	1	100.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	1	0	0	0	0
Walton	3,541	5	16.91	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	2	0	0	0	0	0	2	0
Cooperstown	*3,000	1	4.00	1	100.0	0	0	0	0	0	0	0	0	0	0	1	1000.00	0	0	0	0	0	0	1	0	0	0	0
Oneonta	*5,000	3	7.20	1	33.3	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0
Worcester	*3,000	1	4.00	1	100.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0
Brookfield	3,685	3	9.77	2	66.6	0	0	0	0	0	0	0	0	0	0	1	333.33	1	0	0	1	0	1	0	1	0	0	0
Baldwinsville	*3,000	2	8 00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	1	0	1	0	0
SYRACUSE	*65,000	71	13.11	29	40 9	2	0	1	2	0	0	0	0	0	0	11	225.35	3	12	0	6	2	3	6	2	6	2	13
Geddes	7,000	6	10.29	4	66.6	0	0	0	0	0	0	0	0	0	0	3	500.00	1	0	0	0	0	0	1	0	0	0	0
Cortland	.....	6	.....	1	16.7	0	0	1	0	0	0	0	0	0	0	1	333.34	0	1	0	0	0	2	1	0	0	2	1
Homer	3,500	3	10.03	1	33.3	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	1	0	0	0	0
Rest of district	.....	77	.....	11	14 3	0	0	5	0	0	0	0	0	1	0	3	116.75	0	10	0	6	2	11	12	4	4	10	9
WEST CENTRAL DIST:																												
Totals	.....	127	.....	19	15.0	1	...	1	1	...	...	...	...	...	2	10	118.11	1	25	1	10	9	12	14	3	11	16	10
AUBURN	*26,000	28	12.92	6	21.4	1	0	0	0	0	0	0	0	0	0	6	250.00	0	2	0	2	2	5	4	2	1	2	1

Ithaca	*10,000	7	8.40	1	14.3	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	1	0	1	1	0	0	1	0	1	0
Seneca Falls	6,853	7	12.26	1	14.3	0	0	0	0	0	0	0	0	0	0	1	142.85	0	3	0	1	0	1	0	0	1	0	0	0
Manchester	*4,000	1	3.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	1	0	0	0	0	0	0	1
Phelps	*7,000	5	8.50	1	20.0	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	2	1	0	0	0	4	0	0	0
Canandaigua	6,309	10	19.05	1	10.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	2	0	0	0	0	0	0	4	0	1	1
Lima	*2,800	6	25.72	1	16.7	0	0	0	0	0	0	0	0	0	0	0	.....	0	3	0	0	0	0	0	0	2	0	1	0
Le Roy	*3,000	5	20.00	1	20.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	2	0	3	0
Rest of district	....	58	....	7	12.1	0	0	1	1	0	0	0	0	0	2	3	120.70	0	14	0	5	5	4	5	1	2	3	8	7
LAKE ONTARIO & WESTERN DIST: Totals	....	627	....	270	43.1	7	...	4	3	...	8	9	...	4	33	91	253.59	22	65	16	34	14	36	102	18	39	31	91
OSWEGO	*24,000	23	11.42	6	26.1	0	0	1	0	0	0	0	0	0	0	0	43.46	2	3	0	0	3	2	8	1	0	0	3
Fulton	*4,000	2	6.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	1	0	1	0
Lyons	....	2	.....	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	0	0	0	1	0	0	1	0	0
Arcadia	5,700	9	18.91	1	11.1	0	0	0	0	0	0	0	0	0	0	1	111.11	0	4	0	0	0	0	0	0	0	0	1	0
Sodus	5,285	3	6.80	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	2	0	0	0	0	0	0	0	1	0	0
Wolcott	3,753	3	9.60	1	33.3	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	1	0	0	0	0	0	0	0	0
ROCHESTER	*101,000	166	19.72	76	45.7	0	0	1	0	0	0	0	0	0	12	34	283.14	5	20	5	8	4	12	22	10	9	4	20
Brockport	*4,500	6	11.25	1	16.7	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	1	3	0	1	1	1	0
Mendon	3,200	3	11.25	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	0	0	1	0	1	0
Brighton	3,736	*a*2	7.50	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	1	0	0	0
Albion	5,147	3	7.16	1	33.3	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	1	2	0	0	1	0	3
LOCKPORT	*16,000	*b*6	4.50	1	16.7	0	0	0	0	0	0	0	0	0	0	0	.....	1	1	0	0	0	0	0	0	1	0	0	2
Niagara	7,500	11	17 60	5	45.5	0	0	0	0	0	2	0	0	2	0	0	363.36	0	0	1	1	0	1	0	0	2	0	0	2
BUFFALO	*205,000	*c*289	17.80	154	55.0	7	0	1	1	0	2	9	0	2	15	50	.....	13	22	2	16	3	15	48	2	17	5	50
Tonawanda	4,900	6	14.70	4	66.7	0	0	0	0	0	0	0	0	0	0	1	166.67	0	0	1	1	0	1	0	0	0	0	0	0
Amherst	*4,518	3	8.00	2	66.7	0	0	0	0	0	0	0	0	0	2	0	666.67	0	1	0	0	0	0	0	0	0	0	0	0
Aurora	*3,000	4	12.67	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	1	0	0	1	2	0	0	1	0	0
Hamburg	3,235	8	29.65	2	25.0	0	0	0	0	0	4	0	0	0	0	0	500.00	0	0	0	1	0	0	2	0	0	1	0	0
Rest of district	... .	87	.....	16	18.4	0	0	1	2	0	0	0	0	0	4	5	137.93	0	10	6	6	4	1	13	4	7	15	9
Totals for the State	....	9,318	.....	5,066	54.4	41	2	61	89	4	89	97	14	77	284	2983	401.37	464	883	107	612	318	392	1052	172	375	413	759

a Eight deaths in public institutions. *b* Returns very incomplete. *c* For four weeks ending July 25.

REMARKS.—The total reported mortality is 9,318; the percentage of infant mortality is 54.4. The ratio per 1,000 of deaths from all zymotic diseases to the total mortality is 401.37. From diarrhœal diseases, the number of deaths from which in June was five times that of May, and is in July nearly as much greater than that of June, the ratio per 1,000 to the total mortality is 320.00; they constitute about 75 per cent of the zymotic mortality. The actual mortality from other zymotic diseases and from consumption is about the same as in June; from acute respiratory diseases it is about one-fourth less. With this issue the totals of mortality for each sanitary district may be found on its caption line. For the month of June 198 delayed returns have been received, of which 53 were under five years of age.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of reports of deaths and their causes in the following districts, cities and towns, during August, 1885.

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DIST.: Totals	.....	4,781	.....	2,420	.....	14	1	49	79	...	40	22	14	112	165	1157	326.92	337	602	31	277	213	199	388	99	161	218	607
NEW YORK CITY	*1,397,395	2,991	25.68	1,477	49.3	12	1	32	41	0	16	17	8	82	117	675	334.67	215	413	16	176	147	124	240	60	111	163	325
BROOKLYN	*665,402	1,379	24.70	719	52.5	0	0	13	31	0	24	4	5	24	39	342	352.35	109	142	12	81	54	54	111	30	37	32	235
Gravesend	a*9,000	19	23.11	15	79.0	0	0	0	0	0	0	0	0	0	0	2	11	684.21	2	0	0	1	0	0	1	1	1	0	0
New Lots	*19,000	48	30.32	28	58.32	0	0	0	1	0	0	0	0	0	2	0	14	354.16	3	9	1	3	2	0	5	0	2	3	3
New Utrecht	4,742	17	43.02	5	29.4	0	0	1	0	0	0	0	0	0	0	2	14	176.47	0	2	0	1	0	1	4	0	2	0	4
Flatlands	3,127	8	30.70	6	75.0	0	0	0	0	0	0	0	0	0	0	2	2	250.00	0	1	1	0	0	0	2	0	0	0	2
Newtown	*10,000	31	37.20	16	51.6	0	0	0	2	0	0	0	0	0	0	10	6	387.10	2	6	0	0	1	1	3	0	0	2	4
Oyster Bay	*12,000	19	19.00	9	47.3	0	0	0	1	0	0	0	0	0	0	0	6	368.42	0	1	0	1	0	2	4	1	3	2	1
Hempstead	18,160	51	33.70	26	51.0	0	0	0	0	0	0	0	0	0	0	4	24	549.02	1	7	0	2	1	2	2	0	1	5	2
North Hempstead	7,000	12	20.57	7	58.3	0	0	0	0	0	0	0	0	0	0	0	6	500.00	0	0	0	0	1	0	2	1	1	1	0
Jamaica	10,089	6	7.13	5	83.3	0	0	0	0	0	0	0	0	0	0	0	3	500.00	0	1	0	0	0	0	1	0	0	0	1
Babylon	4,739	64	10.12	0	.....	0	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	1	0	1	0	0	0	1
Southold	7,267	14	23.11	5	35.7	0	0	0	0	0	0	0	0	0	0	0	4	285.71	1	1	0	3	0	1	1	0	0	1	1
Southampton	6,352	11	20.78	5	45.5	0	0	0	0	0	0	0	0	0	0	0	3	272.72	1	0	0	1	0	1	1	1	1	1	1
Northfield	7,014	11	18.81	6	54.5	0	0	0	1	0	0	0	0	0	0	4	4	545.45	0	0	0	0	1	0	1	1	1	0	2
Westfield	5,289	19	43.10	13	68.1	0	0	1	0	0	0	1	1	1	0	7	7	578.68	4	0	0	1	0	1	0	1	0	1	3
YONKERS	*22,000	54	29.45	29	53.7	1	0	1	2	0	0	0	1	0	2	19	19	481.48	3	7	1	3	1	4	3	1	0	2	3
Westchester	*6,900	10	17.39	4	40.0	1	0	0	0	0	0	0	0	0	1	0	1	200.00	0	1	0	1	2	1	0	0	1	0	2
Mount Vernon	*5,000	12	28.80	7	58.4	0	0	1	0	0	0	0	0	0	0	5	5	500.00	0	0	0	0	1	0	1	0	2	2	1
Rye	*7,500	4	6.40	1	25.0	0	0	0	0	0	0	0	0	1	0	0	0	250.00	0	0	0	0	0	1	1	0	1	0	0
Sing Sing	*6,500	16	29.53	6	37.5	0	0	0	0	0	0	0	0	0	0	4	4	250.00	0	5	0	0	0	1	2	0	1	0	3
Rest of district	.....	57	.....	31	54.4	0	0	0	0	0	0	0	0	0	0	16	16	280.70	5	5	0	3	0	3	5	1	1	3	15
HUDSON VALLEY DIST.: Totals	.....	855	.....	371	.....	12	...	22	13	...	7	3	...	5	48	196	357.90	30	101	4	57	36	30	84	26	38	48	95
ALBANY	*96,000	163	20.37	68	41.7	2	0	4	0	0	3	0	0	2	18	24	325.15	7	24	1	14	8	5	14	1	4	7	25
COHOES	*20,000	47	28.20	27	57.5	0	0	4	0	0	1	0	0	0	1	14	14	425.53	2	9	0	1	3	0	3	0	3	3	3
West Troy	*13,000	33	30.46	12	36.4	0	0	4	0	0	0	0	0	0	0	6	4	424.25	5	2	0	6	0	1	0	0	2	0	1
Hoosick Falls	*4,000	8	24.00	6	75.0	0	0	0	0	0	0	0	0	0	1	1	1	250.00	1	0	0	1	0	1	1	0	0	0	0
TROY	*60,000	99	19.80	35	35.3	4	0	1	0	0	0	0	0	0	2	21	282.32	3	20	0	7	5	5	6	7	10	4	3
Lansingburgh	8,500	20	28.22	6	30.0	0	0	1	0	0	0	0	0	0	0	4	4	250.00	0	4	1	0	1	3	1	1	1	3	0

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MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH — (*Continued*).

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrheal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MOHAWK VALLEY DIST.:																												
Waterford	4,328	11	30.50	3	27.2	0	0	0	0	0	0	0	0	0	0	3	272.72	2	1	0	0	0	2	0	0	0	2	1
Ballston Spa	*3,300	11	40.00	5	45.4	0	0	0	0	0	0	0	0	0	0	3	272.72	0	0	1	0	0	0	3	0	1	2	1
Saratoga Springs	10,000	33	39.60	9	32.7	0	0	0	0	0	0	0	0	0	1	9	303.03	0	7	0	0	4	2	4	0	1	2	2
Rest of district	.....	74	.....	29	40.3	0	0	1	0	0	0	0	0	0	1	16	277.78	0	7	0	3	2	8	8	2	2	6	15
SOUTHERN TIER DIST.:																												
Totals	.....	302	.....	78	.....	3	...	3	4	...	1	...	...	0	5	37	272.77	7	22	1	23	5	13	29	9	10	11	17
BINGHAMTON	*20,000	34	20.40	17	50.0	0	0	0	1	0	0	0	0	0	0	7	335.30	1	2	0	5	0	2	9	1	1	1	4
Owego	*6,000	9	18.00	5	55.5	0	0	0	0	0	0	0	0	0	0	3	333.33	0	2	0	0	0	0	0	0	2	0	1
Candor	4,323	5	13.88	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	1	0	0	0	0	0	1	0
ELMIRA	*25,000	36	17.28	14	36.1	0	0	0	2	0	0	0	0	0	0	7	250.00	1	5	0	3	1	0	3	7	5	2	0
Horseheads	3,500	2	6.45	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	1	0	0	0	0	0	0	0	1	0
Bath	7,400	17	27.57	4	23.5	0	0	0	0	0	0	0	0	0	1	3	235.30	0	1	0	2	0	1	3	1	0	1	0
Olean	8,000	11	15.12	8	72.7	0	0	0	0	0	0	0	0	0	1	5	545.45	1	1	0	2	0	1	3	2	0	1	3
Jamestown	12,000	25	25.00	8	32.0	2	0	0	0	0	0	0	0	0	0	2	160.00	1	2	0	9	0	2	2	0	1	2	0
Westfield	3,000	3	12.00	1	33.3	0	0	0	0	0	0	0	0	0	0	1	333.33	0	1	0	0	0	0	0	0	1	2	0
Fredonia	2,800	4	17.10	0	.....	0	0	1	0	0	0	0	0	0	0	0	250.00	1	0	1	0	0	0	0	0	0	2	0
Rest of district	.....	56	.....	21	37.5	1	0	4	1	0	1	0	0	0	3	9	329.21	2	5	0	3	2	5	7	1	3	3	6
EAST CENTRAL DIST.:																												
Totals	.....	271	.....	102	.....	4	...	4	2	...	2	...	1	1	3	67	311.11	12	28	4	11	12	20	27	10	9	16	38
Franklin	3,000	1	4.00	1	100.0	0	0	0	0	0	0	0	0	0	0	1	1000	0	0	0	0	0	0	0	0	0	0	1
Delhi	3,000	2	8.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	0	0	0	0	0
Walton	3,541	2	6.85	1	50.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	2	0	0	0	0	0	0	0
Cooperstown	*3,000	6	24.00	2	33.3	1	0	0	0	0	0	0	0	0	0	1	333.33	2	1	0	0	1	0	0	0	0	0	0
Oneonta	*5,000	11	26.40	7	63.7	0	0	0	0	0	0	0	0	0	0	5	454.55	1	1	0	0	1	0	1	0	0	0	1
Worcester	*3,000	2	8.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	1	0	0	0	0	0	0	0	0	0
Cazenovia	4,363	4	11.50	0	.....	0	0	0	0	0	0	0	0	0	0	1	250.00	0	2	0	0	0	0	1	0	0	1	0
Oneida	.....	6	.....	0	.....	0	0	0	0	0	0	0	0	0	0	1	.....	0	1	0	0	0	0	0	0	0	1	0
Baldwinsville	3,000	3	12.00	1	33.3	0	0	0	0	0	0	0	0	0	0	1	333.33	0	1	0	0	0	0	1	0	0	0	3
SYRACUSE	65,000	117	21.60	63	53.8	1	0	0	1	0	1	0	1	0	1	40	384.61	0	11	2	5	4	4	11	4	6	0	19
Geddes	7,000	12	20.57	6	50.0	0	0	0	0	0	0	0	0	0	0	4	500.00	0	1	0	0	0	1	1	0	0	1	2
Cortland	7,361	5	8.15	2	40.0	0	0	1	0	0	0	0	0	0	0	1	400.00	0	0	0	0	0	0	0	0	0	0	2
Homer	*3,000	5	20.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0
Rest of district	.....	95	.....	19	15.0	2	0	3	0	0	1	0	0	1	2	13	222.23	8	8	2	3	6	11	12	2	3	8	10

WEST CENTRAL DIST.:																															
Totals	.....	172	.....	39	....	1	...	3	2	...	...	1	1	...	3	34	261.05	5	19	2	7	13	12	24	8	8	19	9	3	0	0	0
AUBURN	*26,000	47	21.70	17	36.2	0	0	0	0	0	0	1	1	0	2	15	442.55	3	6	1	4	1	2	8	3	1	0	0	0	0	0	0
Ithaca	10,000	12	14.40	4	33.3	0	0	0	0	0	0	0	0	0	0	6	500.00	0	1	0	1	0	1	3	0	0	0	0	0	0	0	0
Waterloo	*4,500	7	18.66	1	14.3	0	0	1	0	0	0	0	0	0	0	1	285.71	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0
Seneca Falls	6,853	11	19.26	4	36.4	1	0	0	0	0	0	0	0	0	0	2	272.71	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0
Manchester	*4,000	1	3.00	1	100.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Phelps	*7,000	5	8.57	0	...	1	0	0	0	0	0	0	0	0	0	1	400.00	0	1	1	1	1	1	1	0	0	1	0	0	1	0	1
Geneva	*6,000	9	18.00	1	11.1	0	0	0	0	0	0	0	0	0	0	1	111.11	0	1	0	1	0	1	2	0	0	0	0	0	1	0	1
Attica	3,100	3	12.00	1	33.3	0	0	0	0	0	0	0	0	0	0	2	666.66	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
Penn Yan	*1,500	6	16.60	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0
Lima	*2,800	1	4.28	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
Rest of district	.....	70	.....	10	14.3	0	0	1	2	0	0	0	0	0	1	6	142.85	2	7	0	2	9	7	10	4	5	11	3	1	0	0	0
LAKE ONTARIO & WESTERN DIST.: Totals	.....	445	.....	180	....	1	...	9	1	...	4	1	..	...	20	100	307.00	16	49	9	28	13	24	55	20	16	28	49	2	2	0	0
OSWEGO	*24,000	28	11.00	12	42.8	0	0	0	0	0	0	0	0	0	0	8	285.72	0	5	0	2	0	2	5	2	2	0	1	0	0	0	0
Lyons	4,500	19	50.66	4	21.1	0	0	0	0	0	0	0	0	0	1	3	210.53	0	1	0	3	0	3	3	2	2	0	1	0	0	0	0
Newark	*3,500	4	13.74	2	50.0	0	0	0	0	0	0	0	0	0	0	2	500.00	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Palmyra	*4,800	6	15.00	1	16.6	0	0	0	0	0	0	0	0	0	0	0	.....	0	2	0	0	0	1	0	1	0	0	1	0	0	0	0
Wolcott	3,753	1	3.19	0	....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
ROCHESTER	*101,000	204	24.23	99	48.5	0	0	2	0	0	0	0	0	0	9	48	284.36	12	28	4	11	6	10	27	8	7	6	28	0	0	0	0
Brockport	4,500	7	18.66	3	42.7	0	0	0	1	0	0	0	0	0	0	4	714.28	0	1	0	0	0	1	1	0	1	0	0	0	0	0	0
Greece	*5,000	5	12.00	0	....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
Mendon	3,200	3	11.25	2	66.6	0	0	0	0	0	0	0	0	0	0	2	375.00	0	2	1	0	0	0	0	0	0	1	1	0	0	0	0
Brighton	3,736	08	25.69	3	37.5	0	0	0	0	0	0	1	0	0	0	2	555.00	0	1	0	1	2	0	1	0	0	0	0	0	0	0	0
LOCKPORT	16,000	9	6.75	5	55.5	0	0	0	0	0	0	0	0	0	0	4	444.45	0	1	0	1	2	0	1	0	0	0	2	0	0	0	0
Tonawanda	4,900	13	31.83	7	51.0	0	0	0	0	0	0	0	0	0	0	7	540.00	1	0	0	0	0	1	1	0	0	0	1	0	0	0	0
Amherst	4,518	4	10.62	2	50.0	0	0	1	0	0	0	0	0	0	1	1	750.00	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Hamburg	3,235	3	11.13	1	33.3	0	0	0	0	0	0	0	0	0	0	1	333.33	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Aurora	3,000	6	21.00	4	33.3	0	0	0	0	0	0	0	0	0	0	4	333.33	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0
Rest of district	.....	125	.....	35	28.5	1	0	6	0	0	4	0	0	0	0	18	300.81	3	7	1	11	4	6	16	6	3	13	14	0	0	0	0
Totals for the State	.....	7,284	.....	3,405	46.7	43	1	104	103	...	57	28	19	123	260	1719	337.31	419	895	54	430	307	347	675	192	267	366	875	19	3	0	0

REMARKS.— The total reported mortality for the month is 7,284, being considerable less than for July. This is partly accounted for by the failure of Buffalo and Long Island City and several large villages to make reports. The percentage of infant mortality is 46.73; in July it was 54.4, and in June 40.0 per cent. The ratio per 1,000 of deaths from all zymotic diseases to the total mortality is 337.31; that from diarrhœal diseases being 236.00, or about 70 per cent of the total zymotic mortality. From consumption the ratio per 1,000 is 128.87 (the lowest for the year), and from acute respiratory diseases, 57.52. For the month of July 450 delayed returns have been received, of which 85 were under five years of age.

a Also 12 deaths in public institutions.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of reports of deaths and their causes in the following districts, cities and towns, during September, 1885.

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrheal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrheal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DIST.: Totals	.....	4,112	.....	1,708	41.6	18	...	69	89	5	13	7	7	77	203	591	.....	354	611	34	257	218	195	393	85	175	222	479
NEW YORK CITY	*1,397,395	2,647	22.73	1,163	44.0	17	0	49	41	3	4	5	4	56	135	384	264.45	238	415	25	166	177	127	222	56	100	171	247
BROOKLYN	*665,602	1,126	20.30	521	46.3	0	0	14	34	0	17	0	2	17	55	165	270.00	95	158	6	73	54	52	102	21	45	30	186
Gravesend	*7,000	12	20.57	6	50.0	0	0	0	3	0	0	0	0	0	1	4	666.67	0	0	0	0	0	0	1	0	3	0	2
New Lots	*19,000	45	28.42	24	53.3	0	0	6	2	0	0	0	0	1	2	6	244.42	1	6	0	2	0	2	11	1	4	4	4
New Utrecht	4,742	15	26.91	6	46.1	0	0	0	0	0	0	0	0	0	1	1	153.85	0	0	0	1	0	0	1	0	1	1	0
Flatlands	3,127	7	26.85	2	28.6	0	0	0	0	0	0	0	0	0	1	5	857.15	0	0	0	0	0	0	1	0	4	1	0
Newtown	*10,000	26	31.20	12	46.1	0	0	1	1	0	1	0	0	1	1	3	444.44	2	5	0	1	0	0	1	1	0	1	7
Oyster Bay	*12,000	13	13.00	2	15.4	0	0	0	0	0	0	0	0	0	0	2	.....	1	3	0	0	1	1	1	0	0	1	1
Hempstead	18,160	12	8.00	5	43.4	0	0	1	0	0	0	0	1	0	0	2	434.34	1	2	0	1	1	1	0	0	3	0	1
North Hempstead	8,000	11	16.50	3	27.3	0	0	0	1	0	0	0	0	0	0	1	181.82	1	0	1	1	0	0	2	0	0	2	0
Babylon	4,739	4	10.00	0	...	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	1	0	2	1	0	0	1
Southold	7,267	14	20.01	3	21.4	0	0	0	0	0	0	0	0	0	0	1	100.00	0	2	2	1	0	0	0	0	0	1	5
Southampton	6,352	7	13.23	2	28.6	0	0	0	0	0	0	0	0	0	0	1	.....	2	2	0	0	2	0	0	1	0	1	0
Edgewater	*10,000	14	16.80	7	50.0	0	0	0	1	0	0	0	0	0	1	1	285.71	2	3	0	0	1	0	0	0	0	0	6
Northfield	7,014	11	18.86	3	27.3	0	0	0	1	1	0	0	0	0	0	1	181.82	0	1	0	1	0	0	1	0	0	1	7
Westfield	5,289	15	33.96	6	40.0	0	0	0	1	0	0	0	0	0	1	1	333.33	3	1	0	3	0	1	2	1	0	2	1
YONKERS	*22,000	31	16.91	13	42.0	0	0	0	0	0	0	0	0	1	0	7	238.06	3	2	0	1	5	2	4	1	2	0	3
Westchester	*6,900	10	17.40	6	60.0	1	0	0	0	0	0	0	0	0	2	1	400.00	1	1	0	0	1	0	4	1	0	0	1
Mount Vernon	*5,000	9	21.60	4	44.5	0	0	0	0	0	0	0	0	0	0	2	222.22	1	0	0	2	1	0	2	1	0	0	1
Rye	3,500	5	17.15	1	20.0	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	2	0	1	1	0	1	0	0
Sing Sing	*6,500	13	24.00	4	30.7	0	0	0	0	0	0	0	0	0	0	2	153.80	0	0	0	0	1	1	2	0	0	0	4
Rest of district	.....	68	.....	15	23.8	0	0	3	4	0	0	0	0	0	3	5	.....	2	9	0	2	1	4	7	4	10	3	8
HUD. VAL. DIST.: Totals	.....	735	.....	229	31.2	2	...	25	8	...	6	1	2	8	65	81	.....	38	102	13	47	28	52	93	11	31	61	53
ALBANY	*96,000	180	22.50	65	36.1	0	0	7	0	6	1	0	0	2	34	11	305.55	4	31	2	15	6	15	23	1	8	6	14
COHOES	*20,000	12	7.20	4	33.3	0	0	1	1	0	0	0	0	0	0	2	416.67	1	1	0	1	1	0	0	0	0	1	1
West Troy	*13,000	26	23.85	8	30.8	0	0	1	0	0	0	0	0	0	2	6	246.15	4	1	0	1	2	1	4	0	0	2	1
Hoosick Falls	*4,000	12	36.00	4	33.3	0	0	0	0	0	0	0	0	0	3	0	250.00	1	1	0	0	0	2	2	0	1	3	0
TROY	*60,000	107	21.40	42	39.1	8	0	6	0	0	0	0	1	1	1	23	373.83	11	17	5	2	2	6	10	2	3	6	3
Lansingburgh	8,500	15	21.17	6	40.0	0	0	0	0	0	1	0	0	0	0	3	266.67	0	2	1	0	1	2	1	0	1	1	2

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MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH — (*Continued*).

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
SOUTHERN TIER DIST.:																												
Totals	.....	142	.....	31	22.1	...	...	7	1	...	1	...	...	4	1	13	.....	10	29	...	17	6	11	21	24	5	17	12	17
BINGHAMTON	*20,000	16	9.60	1	6.2	...	0	0	0	0	0	0	0	1	0	0	.....	1	2	0	0	0	2	1	2	1	2	0	0
Candor	4,323	3	8.33	1	33.3	0	0	0	0	0	0	0	0	0	0	1	125.00	0	0	0	0	0	0	0	0	0	0	0	0
ELMIRA	25,000	24	11.52	9	37.5	0	0	1	0	0	0	0	0	0	0	1	666.66	2	6	0	5	0	3	3	1	2	3	1	3
Horseheads	3,500	3	10.29	1	33.3	0	0	1	0	0	0	0	0	0	0	1	666.66	0	0	0	0	0	0	0	0	0	0	0	0
Horseheads	*10,000	11	13.20	2	18.2	0	0	2	0	0	0	0	0	0	0	2	363.63	0	1	0	1	0	2	2	0	0	2	2	1
Horseheads	7,500	10	16.22	2	16.6	0	0	0	0	0	0	0	0	0	0	0	444.44	1	0	0	1	0	0	1	1	0	4	2	0
Bath	5,000	9	13.50	6	66.6	0	0	0	0	0	0	0	0	0	0	1	500.00	0	1	0	0	0	0	1	0	0	0	0	0
Bath	12,000	10	10.00	2	20.0	0	0	0	0	0	1	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0	0
Olean	2,800	2	8.57	1	50.0	0	0	0	0	0	0	0	0	0	0	1	500.00	0	0	0	0	0	0	0	0	0	0	0	0
Jamestown	.....	64	.....	8	14.3	0	0	2	0	0	0	0	0	0	0	6	.....	4	7	0	2	1	0	14	5	1	1	2	1
Fredonia	.....																												
Rest of district	.....																												
EAST CENTRAL DIST.:																												
Totals	.....	218	.....	61	28.0	3	4	4	5	0	1	1	0	2	0	31	.....	12	29	0	17	6	11	21	24	5	17	12	17
Franklin	3,000	1	4.00	0	00.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	0	0	0	0	0	0
Hancock	3,228	1	7.20	1	60.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0	0
Walton	8,541	7	23.43	1	14.3	0	0	0	0	0	0	0	0	0	0	1	500.00	0	0	0	0	0	0	1	0	0	0	0	0
Delhi	3,000	7	28.00	3	42.6	0	0	0	0	0	0	0	0	0	0	2	142.86	0	1	0	0	0	0	1	0	0	0	0	0
Otsego	4,700	3	7.66	0	00.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	0	0	0	0	0	0
Oneonta	*5,000	8	19.20	3	42.9	0	0	0	0	0	0	0	0	0	0	3	428.57	0	1	0	0	0	0	2	0	0	2	0	1
Oneonta	*5,000	4	9.60	1	25.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0	0
Oneida	5,000	4	9.60	0	00.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0	0
Canastota	2,500	2	8.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0	0
Baldwinsville	2,500	2	8.00	0	00.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0	0
SYRACUSE	65,000	93	17.17	26	28.0	2	0	1	2	0	0	0	0	0	0	12	192.30	3	6	0	2	0	2	1	1	0	1	0	2
Geddes	7,000	4	6.85	2	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0	0
Cortland	1,361	3	14.60	2	44.4	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0	0
Homer	3,000	5	20.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0	0
Rest of district	.....	71	.....	22	31.0	1	0	3	3	0	1	0	0	1	0	13	.....	4	9	0	7	4	8	5	3	0	3	1	2
WEST CENTRAL DIST.:																													
Totals	.....	123	.....	27	21.1	1	...	4	1	...	...	...	...	1	2	15	.....	8	20	...	10	4	12	26	4	2	7	11	11
AUBURN	*26,000	26	12.00	5	19.2	1	0	0	0	0	0	0	0	0	0	4	192.30	2	6	0	2	0	2	4	2	1	1	1	1
Ithaca	10,000	3	3.60	1	33.3	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	1	0	0	0	0	0
Waterloo	4,500	5	13.33	2	40.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	0	0

Hector	*5,000	3	7.20	0	.....	0	0	0	0	0	0	0	0	0	0	0	0	.....	1	1	0	0	0	1	0	0	0	0	0	0
Seneca Falls	6,353	14	24.50	7	50.0	0	0	1	0	0	0	0	0	0	0	0	4	337.57	1	2	0	2	0	0	1	0	0	0	1	0	2
Manchester	*4,000	2	6.00	0	. ...	0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	1	0	0	0	0	0	0	0	1
Phelps	*7,000	6	10.29	2	33.3	0	0	1	0	0	0	0	0	0	0	2	1	666.67	0	0	0	0	1	0	1	0	0	0	0	0	0
Canandaigua	6,300	1	2.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	1	0	0	0	0	0	0	0	0
Geneva	*6,000	8	21.00	1	12.5	0	0	0	1	0	0	0	0	0	0	0	0	142.85	0	0	0	2	0	3	2	0	0	0	0	0	0
Le Roy	3,000	6	24.00	1	16.6	0	0	0	0	0	0	0	0	0	0	0	0	.....	0	2	0	2	0	0	1	0	0	1	0	0	0
Rest of district	.....	54	....	8	14.8	0	0	2	0	0	0	0	0	1	0	6	.....	4	7	0	2	1	5	14	1	1	4	6		
LAKE ONTARIO & WESTERN DIST.; Totals	.....	463	.....	120	25.9	2	...	14	2	...	6	1	1	...	24	57	.....	28	53	2	29	18	32	63	17	19	41	54		
OSWEGO	*24,000	24	12.00	12	50.0	0	0	0	0	0	0	0	0	0	0	6	250.00	0	3	0	1	1	1	5	0	1	2	4		
Fulton	4,000	8	24.00	0	.....	0	0	1	0	0	0	0	0	0	0	0	0	125.00	1	1	0	1	0	0	2	0	1	1	0		
Lyons	4,500	13	34.66	2	15.4	0	0	0	0	0	0	0	0	0	0	0	0	.....	2	3	0	2	0	0	1	0	3	2	0		
Newark	3,500	3	10.30	1	33.0	0	0	0	0	0	0	0	0	0	0	1	0	333.33	0	0	0	0	0	1	0	0	0	1	0		
Arcadia	5,700	2	4.80	2	100.0	0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	0	2		
Palmyra	4,800	8	20.00	3	37.5	0	0	1	0	0	0	0	0	0	0	2	375.00	0	1	0	2	0	0	0	0	0	1	1		
Wolcott	3,753	2	7.00	1	50.0	1	0	0	0	0	0	0	0	0	0	0	0	500.00	0	0	0	0	0	0	0	0	0	0	1		
ROCHESTER	*101,000	152	18.06	48	31.6	0	0	5	0	0	2	0	0	0	12	11	197.37	10	24	0	7	8	14	20	6	7	6	20		
Brockport	4,500	6	16.00	1	16.6	0	0	1	0	0	0	0	0	0	0	0	166.67	0	0	6	0	0	0	1	0	1	1	2		
Mendon	3,200	7	26.25	2	28.6	0	0	0	0	0	0	0	0	0	0	1	142.85	1	0	6	0	1	0	2	1	0	0	1		
Brighton	3,736	5	16.00	0	.....	0	0	0	0	0	0	0	0	0	1	1	400.00	1	1	0	0	0	0	0	1	0	0	0		
LOCKPORT	16,000	20	15.00	0	. ....	1	0	0	0	0	0	0	0	0	0	1	100.00	5	2	0	0	0	2	4	1	0	0	4		
Niagara	7,500	7	11.20	4	57.1	0	0	1	0	0	0	0	0	0	1	3	714.28	0	1	0	0	0	1	0	0	0	0	0		
Tonawanda	4,900	10	24.06	4	40.0	0	0	0	1	0	1	0	0	0	0	2	400.00	0	0	0	1	0	0	2	1	0	2	0		
Amherst	4,518	1	2.60	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	1	0		
Hamburg	3,235	1	3.80	0	. ....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	0	1	0		
Aurora	3,000	8	32.00	5	62.5	0	0	0	0	0	0	0	0	0	0	4	500.00	0	1	0	0	0	0	1	0	0	0	2		
Rest of district	....	186	.....	35	19.0	0	0	5	1	0	3	1	1	0	10	25	.....	8	16	2	15	8	13	25	7	6	23	17		
Totals for the State	.....	6,251	.....	2,309	37.0	35	...	145	110	5	39	10	12	98	314	839	241.08	475	886	59	412	316	358	651	137	271	398	681		

REMARKS.—The total reported mortality for the month is 6,251, the percentage of infant mortality being 37.0. For the three summer months the average monthly mortality was 8,263, the percentage of infant mortality being 44.1, and the ratio per 1,000 of deaths from all zymotic diseases being 325.75, diarrhœal diseases causing 222 per 1,000 of all deaths. For this month the ratio per 1,000 of deaths from all zymotic diseases is 241.08; from diarrhœal diseases, 134.22; from typhoid fever, 23.20. From consumption the ratio per 1,000 is 141.74, and from acute respiratory diseases, 76.00. Deaths from small-pox are reported from New York city alone. For the month of August 182 additional delayed returns have been received, of which 52 were under five years of age.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of reports of deaths and their causes in the following districts, cities and towns, during October, 1885.

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DIST. Totals	.....	3,806	.....	1,388	.....	14	4	75	59	3	45	3	10	52	276	237	.....	396	651	40	214	230	213	372	100	161	198	453
NEW YORK CITY	*1,397,395	2,392	20.54	872	36.4	13	2	50	35	3	31	2	4	37	170	170	201.28	253	439	23	125	163	125	213	68	95	159	246
BROOKLYN	*665,600	1,079	19.41	402	37.3	0	2	22	17	3	21	1	1	10	58	56	205.55	115	159	14	64	54	66	127	26	58	22	173
Gravesend	5,000	1	2.20	0	0.0	0	0	0	1	0	0	0	0	0	0	0	.....	0	0	0	0	1	0	0	0	0	0	0
New Lots	13,000	40	25.26	24	60.6	0	0	0	1	0	1	0	0	0	0	0	175.00	2	6	0	9	1	2	5	0	2	0	7
New Utrecht	4,742	6	15.20	0	0.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	1	1	1	2	0	2	0	2
Flatlands	3,327	5	19.35	4	80.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	1	1	1	2	0	0	2
LONG ISLAND CITY	*21,000	28	16.00	13	46.5	0	0	1	1	0	0	0	0	2	5	0	200.00	0	0	0	1	0	1	1	0	0	0	3
Newtown	*10,000	27	32.40	10	37.0	0	0	1	1	0	4	0	0	0	5	0	321.42	3	3	1	2	1	0	2	1	3	0	3
Oyster Bay	*12,000	10	10.00	1	10.0	0	0	0	0	0	1	0	0	0	0	0	407.40	3	2	0	3	0	0	4	0	0	4	4
North Hempstead	8,000	6	9.00	2	33.3	0	0	0	0	0	1	0	0	0	0	0	.....	1	2	0	0	0	0	4	0	1	1	1
Jamaica	10,089	9	10.80	2	22.2	0	0	0	0	0	0	0	0	0	2	0	500.00	1	1	0	0	0	1	0	0	1	0	1
Babylon	4,739	7	17.70	0	.....	0	0	0	0	0	0	0	0	0	1	0	111.11	0	1	0	0	1	0	1	0	1	2	1
Southold	7,267	3	5.00	0	.....	0	0	0	1	0	0	0	0	0	0	0	.....	0	0	0	0	0	3	1	3	1	0	0
Southampton	6,352	10	18.89	4	40.0	0	0	0	0	0	0	0	0	1	0	0	333.33	0	0	0	0	0	1	1	2	0	0	0
Edgewater	*10,000	15	18.00	4	26.7	0	0	0	0	0	1	0	0	0	1	0	100.00	0	1	4	0	0	0	0	1	0	0	2
Northfield	7,014	5	8.50	1	20.0	0	0	0	0	0	0	0	0	0	1	1	200.00	1	4	0	0	1	1	0	0	2	0	0
Westfield	5,289	10	22.64	4	40.0	0	0	0	0	0	0	0	0	0	0	1	200.00	2	0	0	0	1	0	0	1	0	0	0
YONKERS	*22,000	41	22.37	14	34.1	0	0	1	1	0	0	0	1	0	1	1	200.00	1	3	0	0	0	2	0	0	2	0	3
Westchester	*6,900	7	12.17	2	28.6	0	0	0	0	0	0	0	0	1	3	1	243.90	6	6	1	2	1	3	0	0	2	3	3
Mount Vernon	*5,000	5	12.00	3	60.0	1	0	0	0	0	0	0	0	0	1	0	.....	2	2	0	0	0	0	4	0	0	1	1
Rye	3,500	6	20.56	2	33.3	0	0	0	1	0	0	0	0	1	1	0	400.00	1	0	0	0	0	0	0	0	0	0	1
Sing Sing	*6,500	11	20.31	4	36.4	0	0	0	0	0	0	0	0	0	3	0	500 00	0	0	1	0	0	0	1	0	0	0	0
New Rochelle	5,276	9	20.47	2	22.2	0	0	0	0	0	0	0	0	0	1	0	272.72	1	0	1	0	0	0	1	2	0	2	0
Rest of district	.....	74	.....	18	24.3	0	0	0	0	0	3	0	1	1	1	4	111.11	1	2	0	1	0	0	2	0	1	0	1
																	175 67	3	17	0	3	3	6	4	3	10	3	9
HUDSON VALLEY DIST. Totals	.....	613	.....	192	.....	7	..	25	10	1	3	3	...	2	37	23	.....	49	84	9	41	37	55	57	16	29	36	69
ALBANY	96,000	170	21.25	69	40.6	3	0	0	0	1	0	0	0	1	37	7	305.88	7	21	1	11	9	15	11	2	4	3	31
West Troy	13,000	19	17.54	4	21.0	0	0	0	0	0	0	0	0	0	1	0	52.60	10	1	0	1	0	0	3	0	1	0	1
Hoosac Falls	*4,000	9	27.00	2	22.2	1	0	0	1	0	0	0	0	0	0	0	222.22	0	3	0	0	1	0	2	0	1	2	0
TROY	*60,000	97	19.40	30	31.0	3	0	4	1	0	0	0	0	1	6	6	216.50	9	17	5	6	7	7	10	2	4	7	2

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MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH — (*Continued*).

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified
MOHAWK VALLEY DIST.:																												
Camden	3,400	8	28.23	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	1	0	1	1	2	4	0	0	0	0
Waterford	4,326	8	22.20	1	12.5	0	0	0	0	0	0	0	0	0	0	0	250.00	1	1	0	0	0	0	1	1	0	0	0
Ballston Spa	3,300	6	21.82	1	16.7	0	0	0	0	0	0	0	0	0	0	0	500.00	1	0	0	0	0	0	0	1	0	1	0
Saratoga Springs	10,000	14	16.80	3	21.4	0	0	1	3	0	0	0	0	0	1	0	385.71	0	0	0	0	0	0	1	0	1	3	0
Rest of district	.....	60	.....	10	16.6	0	0	3	1	0	0	0	0	0	3	0	116.67	4	12	0	2	2	7	8	2	3	5	8
SOUTHERN TIER DIST.:																												
Totals	.....	114	.....	27	.....	1	..	7	3	..	2	..	1	1	5	4	.....	7	16	...	11	4	5	18	5	2	10	12
BINGHAMTON	*20,000	24	11.40	5	20.8	0	0	2	2	0	0	0	0	0	0	0	166.67	1	2	0	4	2	0	4	1	1	2	3
Owego	*6,000	5	10.00	1	20.0	0	0	0	1	0	0	0	0	0	0	0	200.00	0	1	0	0	0	0	1	0	0	1	0
Candor	4,323	3	8.33	0	...	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	0	0	0	2	0	0	0	0
ELMIRA	25,000	21	10.08	6	28.6	0	0	0	0	0	0	0	0	0	2	1	142.86	3	7	0	0	2	1	4	0	0	0	3
Bath	7,400	9	14.60	1	11.1	0	0	0	0	0	0	0	0	0	0	1	111.11	0	3	0	0	0	0	0	0	0	2	4
Olean	8,000	7	10.50	3	42.9	0	0	0	0	0	0	0	0	1	2	0	528.57	0	0	0	1	0	1	1	0	0	0	1
Jamestown	*12,000	13	13.00	4	30.7	1	0	1	0	0	2	0	1	0	0	0	384.62	1	0	1	3	0	1	2	1	0	0	0
Westfield	*3,000	4	12.67	1	25.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	1	1	1	0	0	0
Fredonia	2,800	2	8.57	1	50.0	0	0	0	0	0	0	0	0	0	0	1	500.00	0	0	0	0	0	0	0	0	0	1	0
Rest of district	.....	26	.....	5	19.2	0	0	4	0	0	0	0	0	0	1	1	230.77	1	2	0	3	0	1	4	2	0	3	4
EAST CENTRAL DIST.:																												
Totals	.....	200	.....	33	.....	...	..	11	2	...	..	...	1	1	5	11	.....	7	44	...	13	6	14	29	10	7	17	22
Walton	3,541	7	23.66	2	28.5	0	0	1	0	0	0	0	0	0	0	1	285.71	0	1	0	0	0	1	0	1	1	1	2
Franklin	3,600	3	12.00	1	33.3	0	0	0	0	0	0	0	0	0	0	1	333.33	0	0	0	0	0	1	0	1	0	0	0
Delhi	3,000	4	16.00	0	.....	0	0	0	0	0	0	0	0	0	1	0	250.00	0	0	0	0	1	0	1	0	0	1	0
Liberty	3,209	8	30.00	1	12.5	0	0	0	0	0	0	0	0	0	2	0	250.00	1	1	0	1	0	1	1	0	0	1	1
Cooperstown	*3,000	3	12.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	1	0	0	0	0	1	1
Otsego	4,700	3	7.66	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	2	0	0	0	0	0	0	0	0	0
Oneonta	*5,000	6	14.40	2	22.2	0	0	0	0	0	0	0	0	0	0	1	166.67	0	0	0	1	0	0	1	0	0	0	0
Worcester	*3,000	2	8.00	0	...	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	1	0	0	0	0	0	0	0
Oneida	5,000	6	14.40	0	.....	0	0	2	0	0	0	0	0	1	0	0	500.00	0	1	0	0	0	0	2	0	0	0	0
Brookfield	3,685	1	3.26	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	1	0	0	0
SYRACUSE	*65,000	81	14.95	16	19.8	0	0	5	2	0	0	0	0	0	2	4	160.25	4	18	0	3	2	7	14	2	7	1	10
Geddes	7,000	7	12.00	2	28.6	0	0	1	0	0	0	0	0	0	0	0	142.85	0	2	0	2	0	0	1	0	0	0	1
Cortland	7,361	5	8.15	2	40.0	0	0	0	0	0	0	0	0	0	0	1	200.00	0	0	0	1	0	0	1	0	0	0	2

Homer	3,000	4	16.09	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	1	1	1	0	0	1	0	0	0
Rest of district	....	60	.....	7	11.7	0	0	2	0	0	0	0	1	0	0	3	100.00	2	17	0	4	1	3	8	3	0	11	7	0	1	0
WEST CENTRAL DIST.:																															
Totals	.....	160	.....	28	.....	3	...	7	3	...	...	...	...	1	4	12	.....	9	15	1	13	7	8	23	7	7	22	18	3	1	0
AUBURN	*26,000	24	11.08	6	25.0	3	0	1	1	0	0	0	0	0	1	1	291.67	4	4	0	1	1	0	2	0	0	2	0	0	0	0
Ithaca	‖10,000	10	12.00	2	20.0	0	0	2	0	0	0	0	0	0	1	0	300.00	0	0	0	1	1	0	2	0	0	2	0	0	0	0
Waterloo	*4,500	2	5.34	1	50.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	1	0	0	2	0	0	0	0
Hector	5,000	4	9.60	0	.....	0	0	0	0	0	0	0	0	0	0	1	250.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seneca Falls	6,853	4	7.00	1	25.0	0	0	0	0	0	0	0	0	0	0	1	250.00	1	0	0	0	0	1	0	1	0	1	0	0	0	0
Manchester	*4,000	3	9.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	1	0	0	0	0	0	0	0	0	1	0	0	0
Phelps	*7,000	5	8.59	1	20.0	0	0	0	0	0	0	0	0	0	0	1	200.00	0	0	0	1	0	1	0	1	0	1	0	0	1	0
Canandaigua	6,300	12	22.89	5	41.7	0	0	1	0	0	0	0	0	0	0	2	250.00	1	1	1	1	0	1	0	2	0	1	2	0	0	0
Geneva	*6,000	7	14.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	2	0	1	0	1	0	2	0	2	1	0	0	0
Penn Yan	4,500	4	10.67	1	25.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	1	0	0	0	1	0	1	0	0	0	0
Lima	*2,800	2	8.47	0	... ..	0	0	0	0	0	0	0	0	0	0	0	... ...	0	0	0	0	0	0	0	1	0	1	0	0	0	0
Le Roy	3,000	3	12.00	0	... .	0	0	0	0	0	0	0	0	0	0	0	... ...	0	0	0	0	0	0	0	1	0	1	2	0	0	0
Rest of district	. .....	80	.....	11	13.7	0	0	3	2	0	0	0	0	1	2	6	175.00	2	6	0	8	5	4	17	1	6	7	10	2	1	0
LAKE ONTARIO & WESTERN DIST.: Totals	.....	334	.....	83	.. ..	1	...	13	1	...	3	...	...	1	26	14	.....	27	52	2	20	14	25	47	14	16	26	32	5	1	0
OSWEGO	*24,000	20	10.00	5	25.0	0	0	0	0	0	0	0	0	0	0	2	.....	1	6	0	2	1	0	1	2	2	2	1	1	0	0
Richland	4,000	6	18.00	1	16.7	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	0	0	0	2	0	1	1	0	1	1	0
Fulton	*4,000	4	12.00	0	....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	0	0	0	2	1	0	3	0
Lyons	6,000	13	26.00	4	30.8	0	0	0	1	0	0	0	0	0	0	0	76.92	3	2	0	1	0	1	0	0	1	0	1	0	0	0
Newark	3,500	2	7.00	1	50.0	0	0	0	0	0	0	0	0	0	0	1	....	0	1	0	0	0	0	0	1	0	0	0	0	0	0
Palmyra	4,800	6	15.00	2	33.3	0	0	1	0	0	0	0	0	0	0	0	166.67	1	1	0	0	0	1	1	0	0	0	0	0	0	0
Wolcott	3,753	2	6.40	1	50.0	1	0	0	0	0	0	0	0	0	0	0	500.00	1	1	0	0	1	0	0	0	0	0	0	0	0	0
Clyde	*3,000	6	24.00	2	33.3	0	0	0	0	0	0	0	0	0	0	1	166.67	1	0	0	0	0	2	1	0	0	0	0	0	0	0
ROCHESTER	*101,000	142	13.83	53	37.3	0	0	9	0	0	0	2	0	0	0	22	9	295.77	9	22	1	6	7	6	22	2	5	9	0	0	0
Brockport	4,500	5	15.33	2	40.0	0	0	0	0	0	0	0	0	0	0	0	....	1	2	0	0	0	0	1	0	0	0	0	0	0	0
Greece	*5,000	4	9.60	1	25.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	2	0	1	0	0	0	0	1	1	0	0	0	0
Mendon	3,200	2	7.50	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	1	0	0	0	1	0	0	0
Brighton	3,736	*a*3	9.72	1	33.3	0	0	1	0	0	0	0	0	0	0	0	333.33	0	1	0	0	0	0	1	0	0	1	0	0	0	0
Albion	5,147	*b*12	28.05	2	16.7	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	3	1	3	1	1	0	1	2	0	0	0
LOCKPORT	16,000	16	12.00	0	.....	0	0	1	0	0	0	0	0	0	0	0	62.50	3	3	0	0	2	1	2	2	0	2	3	0	0	0
Tonawanda	4,900	7	17.14	1	14 3	0	0	0	0	0	0	0	0	0	1	0	142.85	0	1	0	0	0	2	1	0	0	0	3	0	0	0
Aurora	3,000	4	12.67	0	....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	2	0	0	0	0	1	0	0	0
Rest of district	.....	80	.....	7	8.8	0	0	1	0	0	1	0	0	1	3	1	87.77	7	10	1	6	3	9	14	6	3	6	8	1	0	0
Totals for the State	....	5,680	....	1,853	32.6	27	4	151	85	5	53	6	15	61	429	324	204.22	525	927	58	342	313	362	603	160	238	341	651	78	15	3

REMARKS.—The total reported mortality for the month is 5,680; the percentage of infant mortality being 32.6. The ratio per 1,000 from all zymotic diseases to the total mortality is 204.22; from typhoid fever, 26.59; from diarrhœal diseases, 57.04, and from croup and diphtheria, 75.53. From consumption the ratio per 1,000 is 163.20, and from acute respiratory diseases, 92.43. There were five deaths from small-pox during the month, three of which occurred in New York, one in Albany and one in Essex county. For the month of September 400 delayed returns have been received, of which 110 were under five years of age.

a Also ten deaths in Monroe county hospital. *b* Also two deaths in Orleans county hospital.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of reports of deaths and their causes in the following districts, cities and towns, during November, 1885.

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrheal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DIST.: Totals	.....	3,727	.....	1,260	.....	14	2	74	54	8	65	13	9	47	348	80	.....	529	589	44	198	241	225	400	93	163	225	306
NEW YORK CITY	*1,397,395	2,364	20.31	822	34.5	11	2	34	24	8	24	11	7	36	213	50	139.17	341	380	25	116	169	145	242	69	119	180	155
BROOKLYN	*665,600	1,058	19.07	351	33.1	0	0	37	26	0	35	2	1	11	110	20	238.73	156	169	16	51	60	51	119	19	25	31	119
Gravesend	5,000	8	19.20	1	12.5	0	0	0	1	0	0	0	0	0	1	1	375.00	0	0	0	1	0	0	2	0	2	0	0
New Lots	10,000	29	18.31	11	37.9	0	0	0	1	0	0	0	0	0	5	3	310.37	1	1	1	4	1	2	6	1	0	0	3
New Utrecht	4,712	9	22.77	2	22.2	0	0	0	1	0	0	0	0	0	0	0	111.11	2	2	0	1	0	0	2	0	0	0	1
Flatlands	3,127	3	11.50	2	66.6	0	0	0	0	0	0	0	0	0	0	1	333.33	1	0	0	1	0	0	0	0	0	0	0
LONG ISLAND CITY	*21,000	32	18.29	12	37.5	0	0	1	0	0	1	0	0	0	3	0	156.25	1	10	0	3	4	1	0	0	2	0	6
Newtown	*10,000	16	19.20	8	50.0	0	0	0	0	0	2	0	0	0	6	0	500.00	1	1	0	2	0	1	0	0	0	0	3
Oyster Bay	*12,000	11	11.00	2	18.2	0	0	0	0	0	0	0	0	0	1	0	90.90	3	0	0	1	0	3	0	0	0	1	1
North Hempstead	*7,000	7	12.00	3	42.9	0	0	0	0	0	1	0	0	0	0	1	285.71	0	1	0	0	1	2	0	0	1	0	0
Jamaica	10,089	4	.....	1	25.0	0	0	0	0	0	0	0	0	0	1	0	500.00	0	0	0	0	0	1	1	0	1	0	0
Babylon	4,739	7	17.72	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	1	1	0	1	2	0	1	0	0
Southold	7,267	5	12.65	1	20.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	1	0	1	2	0	1	0	0
Southampton	6,352	9	17.00	1	11.1	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	1	0	2	0	0	0	0	1
Edgewater	10,000	12	.....	6	50.0	0	0	0	0	0	1	0	0	0	0	0	.....	1	1	0	1	1	2	0	0	0	2	1
Northfield	7,014	6	10.29	2	33.3	0	0	1	0	0	0	0	0	0	0	0	83.33	1	1	0	2	1	1	2	0	0	0	0
Westfield	5,289	9	20.41	3	33.3	0	0	0	0	0	0	0	0	0	0	0	166.67	0	1	0	2	0	0	1	0	0	0	1
YONKERS	*22,000	31	17.00	9	29.0	0	0	0	0	0	0	0	0	0	1	0	111.11	0	3	0	0	1	1	1	0	0	1	1
Westchester	*6,900	14	21.45	5	35.7	0	0	0	0	0	1	0	0	0	2	0	214.29	2	2	0	3	0	0	1	1	0	1	1
Mount Vernon	*5,000	15	36.00	4	26.7	0	0	0	0	0	0	0	0	0	0	0	129.32	4	7	1	2	1	4	4	1	2	1	0
Sing Sing	*6,500	12	22.15	4	25.0	0	0	0	0	0	0	0	0	0	0	1	66.67	3	0	0	3	0	1	3	0	1	0	3
New Rochelle	5,276	2	4.55	1	50.0	0	0	0	0	0	0	0	0	0	2	0	166.67	0	0	0	0	0	1	0	0	1	3	5
Rest of district	.....	64	.....	9	.....	0	0	0	2	0	0	0	0	0	1	2	.....	9	8	0	2	2	6	13	2	8	4	5
HUDSON VALLEY DIST.: Totals	.....	649	.....	164	.....	6	...	18	5	...	2	3	1	2	67	20	.....	74	85	5	33	33	57	88	21	30	38	61
ALBANY	96,000	171	21.35	50	29.2	0	0	6	0	0	0	0	0	0	32	9	380.70	15	17	2	3	10	17	18	3	4	9	26
COHOES	*20,000	a34	20.40	13	37.6	0	0	0	1	0	1	3	0	0	0	1	323.53	6	1	0	2	1	1	3	2	1	4	2
West Troy	13,000	20	18.46	7	35.0	0	0	0	0	0	0	0	0	0	0	0	.....	7	1	0	5	1	0	4	0	2	0	1
Hoosick Falls	*4,000	5	15.00	1	20.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	2	0	0	0	0	0	1	1	0	1
TROY	*60,000	89	17.80	24	27.0	4	0	3	0	0	0	0	0	0	3	2	134.83	12	18	0	6	5	10	11	4	2	3	6

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MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH — (*Continued*).

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MOHAWK VALLEY DIST.:																												
Camden	3,400	2	7.06	0	.....	0	0	1	0	0	0	0	0	0	0	0	500.00	0	0	0	0	0	1	0	0	0	0	0
Waterford	4,326	4	11.11	1	25.0	0	0	0	0	0	0	1	0	0	0	0	250.00	2	0	0	0	0	0	0	0	1	0	0
Ballston Spa	3,300	6	21.82	1	16.7	1	0	1	0	0	0	0	1	0	0	0	500.00	0	2	0	0	0	0	0	0	0	1	0
Saratoga Springs	10,000	21	25.20	1	4.8	0	0	2	1	0	0	0	0	0	0	0	142.86	0	3	0	1	2	0	1	3	2	5	5
Rest of district	.....	43	.....	7	.....	0	0	0	0	0	0	0	0	1	5	0	.....	4	7	0	3	2	5	2	2	2	5	5
SOUTHERN TIER DIST.:																												
Totals	.....	83	.....	29	.....	...	...	4	...	...	2	...	1	2	2	.....	5	8	1	8	5	10	11	4	4	6	10	
BINGHAMTON	*20,000	16	9.60	4	25.0	0	0	0	0	0	0	0	0	0	0	0	125.00	0	2	0	2	0	2	1	1	0	1	1	0
Candor	4,323	3	8.33	1	33.3	0	0	0	0	0	0	0	0	0	1	0	333.33	0	2	0	0	0	1	1	2	0	1	2
ELMIRA	25,000	18	8.64	3	16.6	0	0	1	0	0	0	0	0	0	0	0	55.55	2	2	0	1	1	1	2	3	1	2	2
Hornellsville	10,000	8	9.60	3	37.5	0	0	1	0	0	0	0	0	0	0	0	125.00	1	0	0	1	1	2	0	0	1	2	2
Bath	7,400	05	8.11	1	20.0	0	0	1	0	0	0	0	0	1	0	0	@400.00	1	0	0	1	1	0	0	1	0	0	4
Olean	8,000	3	4.50	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	1	0	0	1	0	0	0	0	0	1
Jamestown	*12,000	12	12.00	5	41.7	0	0	0	0	0	0	0	0	0	0	0	83.33	0	1	0	1	0	2	2	0	0	0	1
Westfield	3,000	2	8.00	1	50.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	1	2	0	0	0
Rest of district	.....	16	.....	2	.....	0	0	0	0	0	0	0	0	0	2	1	.....	0	2	0	2	1	3	2	0	0	2	1
EAST CENT. DIST: Totals	.....	177	.....	30	.....	3	...	7	4	...	...	...	1	1	5	4	.....	16	25	...	7	3	17	21	11	17	12	21
Walton	3,541	2	6.78	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	2	1	0
Delhi	3,000	5	30.00	1	20.0	1	0	0	0	0	0	0	0	0	0	0	800.00	0	0	0	0	0	0	0	2	0	0	0
Cooperstown	*3,000	4	16.00	1	25.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	1	0	1	0	0
Oneonta	*5,000	6	14.40	1	16.7	0	0	0	0	0	0	0	0	0	0	0	.....	2	1	0	0	0	0	1	1	1	0	1
Oneida	5,000	7	16.80	1	14.3	0	0	0	0	0	0	0	0	1	0	0	285.71	1	1	0	0	0	1	0	0	1	0	2
Brookfield	3,685	2	6.51	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	1	0	0	0	1	0
Canastota	2,500	4	19.20	5	.....	0	0	1	0	0	0	0	0	0	0	0	250.00	0	0	0	0	0	0	0	1	1	2	0
Baldwinsville	3,000	6	24.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	1	0	0	0	1	1	0	1	1	0
SYRACUSE	*65,000	65	12.00	16	24.6	0	0	0	4	0	0	0	1	0	2	1	138.46	6	9	0	3	1	4	13	1	7	0	12
Geddes	7,000	4	6.86	0	.....	0	0	2	0	0	0	0	0	0	1	0	750.00	0	0	0	0	0	0	0	1	0	0	1
Cortland	7,361	10	16.30	3	30.0	0	0	0	0	0	0	0	0	0	0	1	100.00	2	2	0	0	0	1	1	1	1	1	0
Rest of district	.....	62	.....	7	.....	1	0	4	0	0	0	0	0	0	1	0	.....	4	11	0	4	3	9	5	5	4	7	3
WEST CENTRAL DIST.:																												
Totals	.....	119	.....	19	.....	..	...	7	1	...	...	...	1	...	4	3	.....	16	17	1	10	3	12	19	5	3	10	7
AUBURN	*26,000	35	16.15	6	17.2	0	0	1	0	0	0	0	0	0	1	1	83.33	8	8	0	3	1	1	3	2	1	3	2

Hector	5,000	3	7.20	0	.....	0	0	1	0	0	0	0	0	0	0	1	1	666.66	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Seneca Falls	6,853	3	5.25	1	33.3	0	0	0	0	0	0	0	0	0	0	1	0	333.33	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Manchester	*4,000	4	12.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	2	0	1	0	0	0	0	0
Phelps	*7,000	10	17.14	1	10.0	0	0	0	0	0	0	0	0	0	0	0	1	100.00	0	2	0	0	0	0	2	4	0	1	0	0	0	0
Canandaigua	6,300	4	7.62	1	25.0	0	0	0	1	0	0	0	0	0	0	0	0	.....	1	1	0	1	0	0	0	0	0	0	0	0	1	1
Geneva	*6,000	7	14.00	2	28.6	0	0	1	0	0	0	0	0	0	0	0	0	142.87	0	1	1	1	1	1	1	0	0	0	0	0	1	1
Penn Yan	4,500	2	5.33	0	.....	0	0	1	0	0	0	0	0	0	0	0	0	500.00	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Lima	*2,800	2	8.57	0	.....	0	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	0	0	0	1	0	0	0	0	0	0	0
Rest of district	.....	49	.....	8	.....	0	0	3	1	0	0	0	1	0	2	0	.....	3	4	0	5	1	5	11	2	1	7	3				
LAKE ONTARIO & WESTERN DIST.: Totals	.....	294	.....	56	.....	...	...	6	1	...	6	...	3	...	26	4	.....	31	45	4	17	9	23	45	11	15	21	27				
OSWEGO	*24,000	25	12.50	1	4.00	0	0	2	0	0	0	0	0	0	1	0	150.00	2	6	0	5	0	2	1	1	1	1	3				
Richland	4,000	2	6.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	0	0	1	1	0				
Fulton	*4,000	3	9.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	0	0	0	0	1	1	0	1				
Lyons	*6,000	6	12.00	2	33.3	0	0	0	0	0	0	0	0	0	0	0	.....	1	1	0	0	0	0	1	0	1	1	1				
Newark	3,500	1	3.43	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	0	0	0	0	0	1	0	0				
Palmyra	*4,800	3	7.50	2	66.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	2	0	0	0	0	0	0	0				
Wolcott	3,753	3	9.61	1	33.3	0	0	0	0	0	0	0	0	0	0	0	.....	1	1	0	1	0	0	0	0	0	1	0				
Clyde	*3,000	3	12.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	1	0	0	0	0				
ROCHESTER	*101,000	150	17.82	39	26.0	0	0	2	0	0	2	0	2	0	19	4	193.34	14	25	2	2	7	9	32	5	5	6	14				
Brockport	4,500	5	13.33	1	20.0	0	0	0	0	0	1	0	0	0	0	0	200.00	0	0	0	0	1	0	1	0	0	0	0				
Mendon	3,200	3	10.94	0	.....	0	0	0	0	0	0	0	0	0	1	0	333.33	0	1	0	0	0	1	0	0	0	0	0				
Brighton	3,736	*b*5	16.06	0	.....	0	0	1	0	0	0	0	0	0	0	0	*b*200.00	0	0	0	0	0	1	1	1	0	0	0				
Albion	5,147	6	14.00	2	33.3	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	1	0	2	1	0	0	1	2				
LOCKPORT	16,000	10	7.50	0	.....	0	0	0	0	0	0	0	0	0	1	0	100.00	0	1	0	1	0	3	1	0	0	1	0				
Tonawanda	4,900	3	7.55	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	1	0	0	0	0	0	0	1	0	0				
Amherst	4,518	3	8.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	1	0	0	0	0	0	0	0				
Hamburg	3,235	3	11.12	1	33.3	0	0	0	0	0	2	0	0	0	1	0	100.00	0	0	0	0	0	0	0	0	0	0	0				
Aurora	3,000	1	4.00	0	....	0	0	0	0	0	0	0	0	0	0	0	.....	1	0	0	0	0	0	0	0	0	0	0				
Rest of district	.....	59	.....	7	.....	0	0	1	1	0	1	0	1	0	3	0	.....	10	5	2	4	1	5	6	1	4	8	5				
Totals for the State	.....	5,448	.....	1,620	29.7	25	2	126	69	8	77	17	19	53	478	115	181.35	716	831	63	302	310	388	619	158	249	359	479				

REMARKS.— The total reported mortality for the month is 5,448; the percentage of infant mortality being 29.7. The ratio per 1,000 of deaths from all zymotic diseases to the total mortality is 181.85; that from typhoid fever being 23.00; from diarrhœal diseases, 21.17, and from croup and diphtheria, 87.98. From consumption the ratio per 1,000 is 152.59, and from acute respiratory diseases, 131.23. No deaths from small-pox are reported during the month outside of New York city. For the month of October 186 delayed returns have been received, among other places from Hornellsville, Penn Yan, Amherst, Seneca Falls, Flushing and Goshen.

a Not including four deaths in Soldiers' Home. *b* Besides six deaths in Monroe County Hospital.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of reports of deaths and their causes in the following districts, cities and towns, during December, 1885.

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DIST.: Totals	.....	4,174	.....	1,548	37.1	18	5	51	49	5	91	9	18	91	424	74	201.25	765	609	42	165	253	226	398	109	149	251	366
NEW YORK CITY	*1,397,395	2,743	23.55	1,048	38.2	15	5	26	27	5	43	6	11	76	293	53	204.15	486	397	26	109	175	152	243	68	102	212	213
BROOKLYN	*665,600	1,184	21.03	426	35.9	0	0	24	15	0	47	3	7	9	110	19	189.18	243	168	13	39	69	61	123	34	37	25	141
Gravesend	5,000	6	14.40	2	33.3	0	0	0	1	0	0	0	0	0	1	0	333.33	2	0	0	0	0	2	0	0	0	0	0
New Lots	†19,000	31	19.58	10	32.3	2	0	1	2	0	0	0	0	0	5	0	322.58	4	2	0	2	2	0	5	0	3	1	2
New Utrecht	4,742	3	7.60	2	66.6	0	0	0	0	0	0	0	0	0	2	0	666.66	0	0	0	0	0	0	0	0	3	0	1
Flatlands	3,127	4	15.35	2	50.0	0	0	0	0	0	0	0	0	0	1	0	250.00	2	1	0	0	0	0	0	0	0	0	0
Newtown	*10,000	10	12.00	4	40.0	0	0	0	0	0	2	0	0	1	1	0	400.00	2	2	0	1	1	0	0	0	0	0	0
Oyster Bay	*12,000	10	10.00	2	20.0	0	0	0	0	0	0	0	0	0	1	0	100.00	1	3	0	1	1	0	2	0	0	0	1
North Hempstead	*7,000	8	13.71	2	25.0	0	0	0	0	0	0	0	0	0	1	0	125.00	2	1	0	0	0	2	1	0	1	0	1
Babylon	4,739	5	12 70	0	....	0	0	0	0	0	0	0	0	0	0	0	.....	3	1	0	0	0	0	0	0	0	1	0
Southold	7,267	8	13.21	0	....	0	0	0	0	0	0	0	0	0	0	0	.....	0	2	0	0	0	1	2	0	0	3	0
Southampton	6,352	9	16.95	0	.....	0	0	0	0	0	0	1	0	0	0	0	111.11	0	2	1	0	0	0	1	0	1	2	0
Edgewater	10,000	15	18.00	7	46.6	0	0	0	0	0	0	0	0	0	3	0	200.00	1	5	0	1	0	0	1	0	1	2	1
Northfield	7,014	10	17.14	1	10.0	0	0	0	0	0	0	0	0	0	0	0	.....	2	2	0	1	0	0	2	2	1	2	1
Westfield	5,289	11	24.90	2	18.1	1	0	0	1	0	0	0	0	0	1	0	181.81	3	2	0	1	0	1	0	1	1	0	1
YONKERS	*22,000	31	16.91	16	51.6	0	0	0	1	0	0	0	0	1	3	1	193.55	8	2	0	1	2	1	7	1	0	2	3
Westchester	*6,900	9	15.65	1	11.1	0	0	0	0	0	0	0	0	0	3	0	333.33	1	5	0	0	0	0	0	0	0	0	0
Mount Vernon	*5,000	10	24.00	2	18.2	0	0	0	0	0	0	0	0	0	1	0	100.00	0	6	1	0	3	0	2	0	0	3	0
Rye	3,500	2	7.00	0	....	0	0	0	0	0	0	0	0	0	0	0	500.00	0	0	0	0	0	1	0	0	0	0	0
Sing Sing	*6,500	11	20.31	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	2	0	0	1	2	2	0	1	2	1
New Rochelle	5,276	9	20.47	2	22.2	0	0	2	0	0	0	0	0	0	2	0	444.44	2	1	0	0	0	1	1	0	2	0	1
Rest of district	.....	45	.....	14	31.1	0	0	1	1	0	1	0	0	0	1	1	111.11	3	11	0	8	0	2	6	2	2	1	5
HUD. VAL. DIST.: Totals	.....	678	.....	180	26.7	6	7	24	5	2	3	7	4	2	74	7	265.66	86	100	8	29	23	69	95	24	27	30	46
ALBANY	96,000	150	18.74	45	30.0	1	7	7	0	0	0	0	1	0	22	2	266.67	14	23	3	3	4	12	18	5	2	3	13
COHOES	*20,000	43	25.80	20	46.5	0	0	6	0	0	2	7	0	0	9	0	558.14	4	4	0	0	0	0	4	1	0	3	3
West Troy	13,000	26	24.00	6	23.1	0	0	1	0	0	0	0	0	0	2	0	76 92	3	1	0	1	2	2	5	0	2	0	2
Hoosick Falls	*4,000	5	15.00	1	20.0	0	0	0	0	0	0	0	1	0	0	0	200.00	1	0	0	0	0	2	0	0	0	0	0
TROY	*60,000	83	16.60	24	28.9	2	0	5	0	0	0	0	0	0	3	2	144.58	14	13	3	2	0	12	9	5	2	2	12
Lansingburgh	*9,700	14	17.32	3	21.5	0	0	1	1	0	0	0	1	0	0	0	214.28	3	4	0	1	1	0	0	0	2	0	0

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MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH — (*Continued*).

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
Saratoga Springs	10,000	63	14.40	1	8.3	0	0	1	0	0	0	0	0	0	0	0	83.33	2	0	0	1	0	0	3	0	3	3	2
Rest of district	.....	12	.....	7	11.1	0	0	1	0	0	0	0	1	0	3	0	79.36	9	6	0	2	6	5	9	5	1	7	3
SOUTHERN TIER DIST.:																												
Totals	.....	149	.....	23	15.6	1	...	3	2	...	...	...	3	...	6	1	106.67	16	17	2	12	8	12	23	6	6	15	16
BINGHAMTON	*20,000	19	11.40	2	22.2	0	0	0	0	0	0	0	1	0	1	0	222.22	5	1	0	0	0	3	4	1	0	2	1
Candor	4,323	3	8.33	0	.....	0	0	0	1	0	0	0	0	0	1	0	333.33	0	2	0	0	0	2	0	0	0	2	0
ELMIRA	25,000	30	14.40	5	16.3	0	0	1	0	0	0	0	0	0	1	0	333.33	2	4	0	4	2	2	6	0	3	2	2
Horseheads	3,500	2	6.86	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	0	0	0	0	0
Hornellsville	10,000	2	2.40	1	50.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	0	0	0	0	0	0	0	1	1
Bath	7,600	14	6.48	1	25.0	0	0	0	0	0	0	0	0	0	1	0	.....	1	1	0	0	1	0	0	0	1	1	1
Olean	8,000	11	16.50	5	45.5	1	0	0	0	0	0	0	0	0	1	0	181.81	0	2	0	0	0	1	3	0	1	3	1
Jamestown	12,000	16	16.00	4	25.0	0	0	1	0	0	0	0	1	0	2	0	250.00	4	0	0	2	0	3	2	0	1	1	1
Rest of district	.....	62	.....	5	8.0	0	0	1	1	0	0	0	1	0	1	0	64.51	4	7	2	6	4	3	11	5	1	8	7
EAST CENTRAL DIST.:																												
Totals	.....	205	.....	32	15.6	...	...	3	...	...	1	...	...	...	13	2	92.68	28	38	1	8	6	12	27	10	2	24	30
Walton	3,541	4	13.59	2	50.0	0	0	0	0	0	0	0	0	0	0	0	250.00	0	2	0	0	0	0	0	0	0	0	1
Delhi	3,000	5	20.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	2	0	0	0	0	1	1	0	0	0
Cooperstown	*3,000	2	8.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	1	0	0	0	1	0	1	0
Oneonta	*5,000	6	15.20	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	1	0	0	0	2	0	0	1	2
Worcester	*3,000	3	12.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	1	2	0	0	0	1	0	0	2	0
Cazenovia	4,363	3	8.25	0	....	0	0	0	0	0	0	0	0	0	0	0	.....	0	2	0	0	0	0	0	0	0	0	0
Canastota	2,500	4	19.20	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	2	0	0	0	0	1	0	0	0	1
Baldwinsville	3,000	4	16.00	0	.....	0	2	0	0	0	0	0	0	0	0	0	500.00	0	0	0	0	0	0	0	0	0	0	0
SYRACUSE	*65,000	73	13.48	15	20.5	0	0	1	0	0	0	0	0	0	3	1	68.50	14	18	0	2	3	3	6	4	1	2	10
Geddes	7,000	5	8.57	1	25.0	0	0	0	0	0	0	0	0	0	1	0	200.00	0	1	0	0	0	0	0	0	0	1	3
Homer	3,000	4	16.00	2	50.0	0	0	0	0	0	0	0	0	0	1	0	500.00	0	0	0	0	0	0	0	0	0	1	1
Rest of district	.....	92	.....	12	18.0	0	0	0	0	0	0	0	0	0	8	0	86.87	14	9	1	5	3	4	16	4	1	15	12
WEST CENTRAL DIST.:																												
Totals	.....	118	.....	14	11.9	...	..	4	1	...	...	...	...	...	3	2	84.74	7	21	...	12	6	15	19	3	2	11	12
AUBURN	*26,000	25	11.54	3	12.0	0	0	0	1	0	0	0	0	0	0	0	40.00	2	5	0	2	0	2	6	2	2	1	4
Ithaca	10,000	7	8.40	0	.....	0	0	1	0	0	0	0	0	0	0	0	142.86	0	0	0	1	1	0	1	0	0	1	0
Hector	5,000	6	14.00	0	.....	0	0	1	0	0	0	0	0	0	0	0	166.67	1	0	0	0	0	0	1	1	0	2	0

Manchester	*4,000	2	6.90	1	50.0	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	1	0	0	1	0	0	0	0	0
Phelps	*7,000	2	3.43	0	.....	0	0	1	0	0	0	0	0	0	0	0	500.00	0	0	0	0	0	0	0	0	0	0	0	0
Geneva	*6,000	11	22.00	2	18.2	0	0	0	0	0	0	0	0	0	0	0	.....	1	3	0	2	2	0	0	1	0	1	1	1
Lima	*2,800	3	12.85	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	2	0	0	0	0	0	0	0	0	0	1
Rest of district	.....	62	.....	8	12.9	0	0	1	0	0	0	0	0	0	3	2	96.77	3	11	0	6	3	11	9	1	0	6	6	
LAKE ONTARIO & WESTERN DIST.; Totals.	.....	324	.....	35	10.8	1	...	4	1	...	4	...	1	1	24	1	114.20	37	41	5	22	14	26	47	17	10	32	36	
OSWEGO	*24,000	26	13.00	3	11.5	0	0	1	0	0	0	0	0	0	1	0	76.92	5	4	1	0	1	3	1	2	0	4	3	
Richland	4,000	6	18.00	0	.....	0	0	0	0	0	0	0	0	0	1	0	166.66	0	1	0	0	0	0	1	0	0	3	0	
Fulton	*4,000	5	15.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	2	0	0	0	0	1	1	0	0	0	
Lyons	*6,000	11	22.00	3	27.3	0	0	0	1	0	0	0	1	0	0	0	181.81	2	0	0	0	0	2	3	0	1	0	1	
Newark	3,500	6	20.57	1	16.7	0	0	0	0	0	0	0	0	0	0	0	.....	2	0	0	0	0	1	2	1	0	0	0	
Palmyra	*4,800	6	15.00	1	16.7	0	0	0	0	0	0	0	0	0	0	0	.....	1	1	1	1	0	0	1	0	0	0	1	
ROCHESTER	*101,000	147	17.46	49	33.3	0	0	1	0	0	3	0	0	0	17	0	142.85	15	21	2	9	8	8	21	5	3	13	21	
Brockport	4,500	6	16.00	1	16.7	0	0	0	0	0	1	0	0	0	1	0	333.33	1	1	0	0	0	1	0	1	0	0	0	
Greece	*5,000	3	7.20	1	33.3	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	1	0	0	0	1	0	0	1	
Brighton	3,736	c4	12.85	0	.....	0	0	0	0	0	0	0	0	0	1	0	250.00	1	0	0	0	0	0	1	0	0	1	0	
Albion	5,000	5	12.00	3	60.0	1	0	0	0	0	0	0	0	0	0	0	200.00	1	0	0	0	0	1	2	0	0	0	0	
LOCKPORT	16,000	13	9.75	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	1	1	1	0	0	2	1	2	1	0	4	
Amherst	4,518	2	5.31	0	.....	0	0	1	0	0	0	0	0	0	0	0	500.00	0	0	0	0	0	0	0	1	0	0	0	
Hamburg	3,235	2	7.42	0	.....	0	0	0	0	0	0	0	0	0	1	0	500.00	0	0	0	0	1	0	0	0	0	0	0	
Aurora	3,000	1	4.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	.....	0	0	0	1	0	0	0	0	0	0	0	
Rest of district	.....	81	.....	13	16.0	0	0	1	0	0	0	0	0	1	2	1	61.72	7	10	0	10	4	8	13	3	5	11	5	
Totals for the State	.....	6,096	.....	1,918	37.3	32	12	99	60	7	112	17	28	95	572	93	185.42	985	880	61	273	330	408	665	192	214	405	556	

REMARKS.—The total reported mortality for the month is 6,078; fifty returns have been received additional, of which three are from Newtown, four from Malone, six from Westfield and ten from Seneca Falls. The ratio per 1,000 of deaths from all zymotic diseases to the total mortality is 185.42; that from typhoid fever being 16.24; from diarrhœal diseases, 15.26, and from croup and diphtheria, 93.77. From consumption the ratio per 1,000 is 141.80, and from acute respiratory diseases, 161.00. Five deaths from small-pox are reported from New York city, and one each from the towns of Kinderhook and Saugerties, no other cases having developed in the latter localities. From typhus fever five deaths are reported from New York city and seven from Albany, where an outbreak has occurred in the county penitentiary. No returns are received for the month from Long Island City. For November 165 delayed returns have been received.

a Four of these in public institutions. *b* Besides eleven deaths in Soldiers' Home. *c* Besides six in public institutions.

SUMMARY OF MORTALITY OF THE STATE OF NEW YORK, FOR THE YEAR 1885, AS PUBLISHED IN THE MONTHLY BULLETIN.

Totals of Mortality in the several Sanitary Districts for the Year.

	Total number of deaths.	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.
Maritime District	55,021	22,436	40 8	233	18	488	718	28	989	948	230	694	3,207
Hudson Valley District	8,941	2,688	30.0	86	7	249	95	3	63	109	25	48	580
Adirondack and Northern District	2,428	626	25.8	20	.....	47	12	1	19	11	11	28	175
Mohawk Valley District	3,174	647	20 4	32	.....	62	19	.....	19	36	20	12	142
Southern Tier District	1,741	404	23.2	10	.....	41	21	.....	20	18	14	14	48
East Central District	2,444	537	22 0	26	.....	48	21	1	10	14	11	8	80
West Central District	1,812	306	16.9	15	.....	45	24	.....	3	3	12	7	41
Lake Ontario and Western District	4,745	1,258	26.5	24	.....	99	31	.....	53	31	31	22	235

SUMMARY OF MORTALITY, ETC.— (*Continued*).

	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
Maritime District	5,828	243.20	8,036	7,896	648	2,813	3,095	2,863	5,252	1,087	1,989	2,909	5,056
Hudson Valley District	560	204.10	1,059	1,295	99	496	370	717	1,216	238	333	523	767
Adirondack and Northern District	113	180.00	268	359	38	149	64	299	283	66	89	217	269
Mohawk Valley District	183	168.55	366	456	41	185	111	263	452	99	115	293	268
Southern Tier District	97	161.40	195	199	31	132	61	145	223	68	86	135	163
East Central District	146	182.10	286	342	22	149	86	197	291	89	104	212	301
West Central District	90	132.45	196	281	22	138	85	167	275	68	80	218	162
Lake Ontario and Western District	285	170.90	460	617	73	290	189	337	658	177	198	390	555

SUMMARY OF MORTALITY, ETC.—(*Continued*).

Totals of Mortality of the State by Months.

	Total number of deaths.	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.
January	6,571	2,163	32.9	42	2	92	64	.....	127	177	29	58	443
February	6,606	2,288	34.3	40	1	52	70	.....	126	154	41	53	412
March	7,391	2,561	34.6	40	.....	60	71	.....	135	180	63	67	352
April	7,016	2,275	32.5	31	.....	68	75	1	141	191	44	56	326
May	6,542	2,094	32.2	53	1	55	74	.....	122	165	38	47	319
June	6,204	2,483	40.0	37	1	54	74	3	106	128	32	46	319
July	9,318	5,066	54.4	41	2	61	89	4	89	97	14	77	284
August	7,284	3,405	46.7	43	1	104	103	.....	57	28	19	123	260
September	6,251	2,306	37.0	35	.....	145	110	5	39	10	12	98	314
October	5,680	1,853	32.6	27	4	151	85	5	53	6	15	61	429
November	5,448	1,620	29.7	25	2	126	69	8	77	17	19	53	473
December	6,096	1,913	31.4	32	12	99	60	7	112	17	28	95	572
Total	80,407	30,027	37.3	446	26	1,067	944	33	1,184	1,170	354	834	4,508

SUMMARY OF MORTALITY, ETC.— (*Continued*).

	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
January	104	111.20	1,078	1,028	93	329	371	404	691	148	165	425	71
February	89	125.37	1,396	929	95	302	338	437	712	149	190	456	564
March	113	146.08	1,684	1,083	118	329	368	481	812	165	200	467	603
April	106	132.55	1,441	1,049	94	347	395	487	761	81	236	522	564
May	136	154.70	1,038	1,033	94	331	345	407	707	161	312	387	717
June	680	238.55	643	814	78	334	328	432	703	172	277	356	587
July	2,983	401.37	464	883	107	612	348	392	1,052	172	375	413	759
August	1,719	337.31	419	895	54	430	307	347	675	192	267	366	875
September	839	241.08	475	886	59	412	316	358	651	137	271	398	681
October	324	204.22	525	927	58	342	313	362	603	160	238	341	651
November	115	181.85	716	831	63	302	310	388	619	158	249	353	470
December	93	185.42	985	880	61	273	330	408	665	192	214	405	556
Total	7,301	222.17	10,864	11,238	974	4,343	4,069	4,903	8,651	1,887	2,994	4,889	7,728

IN EACH 1,000 DEATHS THERE WERE IN THE—	From typhoid fever.	From diarrhœal diseases.	From croup and diphtheria.	From consumption.
Maritime District	8.87	10.60	58.28	143.51
Hudson Valley District	27.85	62 63	64.87	144.83
Adirondack and Northern District	19.35	46.54	72.08	147.82
Mohawk Valley District	19.53	57.65	44.74	143.67
Southern Tier District	23.55	55.70	27.57	114.25
East Central District	19.64	59.74	32.74	139.93
West Central District	24.78	49 67	22.63	155.08
Lake Ontario and Western District	20.85	60.00	49.53	130.00
The Entire State	13.27	90.80	56.06	139.76

For the entire State the ratio per 1 000 of deaths from all zymotic diseases to the total mortality in 1885 is 222.17, against 269.12 for nine months of 1884. This diminution, as will appear from the forthcoming report of the Secretary, is largely in typhoid fever and the diarrhœal diseases; the conjoined ratio per 1,000 from these diseases is 104.07, against 146.40 in 1884. As these are especially controlled by public hygienic improvements, this indicates the efficiency of the sanitary work that has been done, and is emphasized by the ratio of diphtheria, which depends largely upon domiciliary conditions, viz.: 56.06 per 1,000 total deaths in 1885, and 47.65 in 1884. These three typify the filth diseases. There is no material change in the other zymotic diseases.

Estimating the present population of the State at 5,400,000, an annual death rate of twenty per 1,000 would give 108,000 total mortality. The reported mortality with about 3,000 death reports received after the bulletin is issued, and the mortality of Buffalo, account for about 88,000 deaths. During the year about 5,000 more deaths were reported than in 1884, showing that more local boards are organized and that the returns are more complete.

REMARKS.— The SANITARY DISTRICTS into which the State is divided are as follows: *Maritime*, includes New York, Long Island, Staten Island and Westchester county. *Hudson Valley*, all the counties except Westchester on either side of the Hudson river, to the head of navigation, to and including Albany and Rensselaer. *Adirondack and Northern*, the northern section of the State — the counties of Washington, Warren, Hamilton, Essex, Clinton, Franklin, St. Lawrence, Jefferson and Lewis. *Mohawk Valley*, Schenectady, Schoharie, Saratoga, Montgomery, Fulton, Herkimer and Oneida counties. *Southern Tier*, the seven counties along the southern boundary. *East Central*, Sullivan, Delaware, Otsego, Madison, Chenango, Onondaga and Cortland counties. *West Central*, Cayuga, Tompkins, Seneca, Schuyler, Ontario, Yates, Livingston, Genesee and Wyoming counties. *Lake Ontario and Western*, Oswego, Wayne, Monroe, Orleans, Niagara and Erie counties. In the *Maritime* District, population 2,098,580 (census 1880), are the CITIES of New York, Brooklyn, Long Island City and Yonkers; in the *Hudson Valley* District, population 750,143, Albany, Cohoes, Troy, Hudson, Kingston, Poughkeepsie and Newburgh; in the *Adirondack and Northern* District, population 330,434, Ogdensburgh and Watertown; in the *Mohawk Valley* District, population 280,809, Schenectady, Amsterdam, Utica and Rome; in the *Southern Tier* District, population 365,746, Binghamton and Elmira; in the *East Central* District, population 354,320, Syracuse; in the *West Central* District, population 321,247, Auburn; in the *Lake Ontario and Western* District, population 578,705, Oswego, Rochester, Lockport and Buffalo.

[This circular with the accompanying No. 38 of the Board, was sent to border town boards as soon as danger of approach of small-pox from Montreal became threatening.]

STATE BOARD OF HEALTH OF NEW YORK.

ALBANY, *October* 8, 1885.

To the Health Officer of :

DEAR SIR — Be kind enough to bring to the notice of your board of health the desirability of passing and enforcing the following resolution:

"Until further notice from this board, no person shall be permitted to enter this (town or village, as the case may be) without satisfactory evidence of recent vaccination, if coming from Canada, or other places where small-pox is known or believed to exist."

Personal baggage or articles liable to convey contagion from infected places should also be refused admission until disinfected.

Faithfully yours,

ALFRED LUDLOW CARROLL, M. D.,
Secretary.

[No. 38.]

STATE BOARD OF HEALTH OF NEW YORK.

PREVENTION OF SMALL-POX.

Duties of the Local Authorities — Health Officers and Others.

SMALL-POX IS LIABLE TO APPEAR IN ANY PLACE where there are unvaccinated persons. It is dangerous to life, and is a misfortune which causes loss and great disturbance in the affairs of any community that does not immediately secure to every inhabitant the necessary protection by **vaccination** and **re-vaccination**, and by thorough quarantine and disinfection of the contagion.

The Laws in this State require:—

(1.) That all who are in attendance at the public schools shall present evidence of their having been vaccinated; also that after ten days' notice any person may be excluded from school who is not so protected against Small-pox. (Chap. 438, Laws of 1860.)

(2.) That it shall be the duty of all local Boards of Health promptly to report to the State Board of Health every case of Small-pox, and to immediately provide thorough and safe vaccination for all persons who need the same, within the jurisdiction of said local Board; also to isolate and keep in quarantine, and to regulate, prohibit or prevent communication or intercourse with persons, houses and places that have Small-pox.

(3.) That the local Board of Health shall suitably provide places and means for the complete separation and sanitary care of infected persons and things. [See Circular No. 27: "Contagious Disease Refuges."]

VACCINATION IS A PUBLIC DUTY for the protection of the whole community as well as of each individual and family; and it is so necessary to secure its protection in all places and for all classes of people that **none have a right to neglect it** for themselves, their families, the public schools or the community. The State Board of Health has directed its Secretary to give whatever information or advice is needed to secure the most perfect vaccine matter and the speediest and best application of it whenever and wherever it is required.

THE STATE BOARD ADVISES and requires that the law for **vaccination** of all who attend school shall be faithfully observed; and

That every local Board of Health be prepared against Small-pox, —

By an agreement with all physicians to secure perfect vaccination in every house hold where they attend:

By instructions to Health Officers to ascertain who are unvaccinated and exposed:

By notifying the State Board of Health at once, when and where Small-pox appears; and,

By requiring prompt compliance with the local Board's orders, and by immediately instructing and aiding the community in regard to the same.

A WORD OF SUGGESTION AND WARNING TO ALL. *Every infant* should be vaccinated before it is six months old, unless a good physician advises to the contrary. Every person who has passed the age of twelve years should be re-vaccinated to test

the fact of complete protection against Small-pox; and those who have had that disease should be vaccinated, as it may attack a person who was marked by it, as well as a person who has been only once vaccinated. **Sufficient vaccination removes all liability** to the disease. For this purpose **re-vaccination is earnestly advised.** Vaccination with lymph from clean and healthy inoculated heifers causes no disease. It can be obtained fresh every day from perfectly healthy calves, and within a day or two can be at hand for use in any town in this State, at a cost of from six to twelve cents for each "slip" or "point." The Board of Health in each of the cities is earnestly requested to keep such a supply of *vaccine* at hand that it can instantly meet any exigency, or furnish a neighboring community with a few points of the lymph at cost. It should be inserted by physicians only, and they should examine the result at the end of seven days.

What to do when Small-pox occurs: —

(1.) Place the sick in a separate room from which all clothing, carpets, upholstered stuff and the quilts and feather bedding have been removed beforehand. In such a room with open windows and an open fire, keep the sick and nurses entirely separated from all other persons until the Doctor and Health Officer take charge. Then **follow their requirements.**

(2.) Let all persons who are near the sick be immediately vaccinated afresh, and let it be understood from the first that all bedding, clothing, towels and cloths which are touched or used by the sick shall be burned if they cannot be otherwise satisfactorily disinfected; and every place where the sick are, where there is anything that has come from or been exposed to them, shall be thoroughly disinfected as soon as possible.

(3.) A separate place, or even a hut constructed for the purpose, should be so prepared as to be safer for the sick than any ordinary dwelling rooms; that is, that the fresh air and sanitary care and nursing shall be the best possible; and that it shall be an apartment and locality from which the contagion will not be spread abroad.

(4.) No delay or objection should prevent the vaccination of all persons who have been in any manner exposed, or suspected of exposure, to the contagion. If fresh **vaccine** is not at hand, the physician, or the Health Officer should telegraph to the nearest person who can supply it. If that request is not immediately complied with, then telegraph to the State Board of Health, or to Dr. J. B. Taylor, Health Department, 301 Mott street, New York.

(5.) In case of death, wrap the corpse in a sheet saturated with the strongest disinfectant, and bury it in a deep grave within twenty-four hours, and without a public funeral.

Among the disinfectants easily attainable are: —

For clothing, bed linen, etc. — Sulphate of zinc and common salt, dissolved together in water in the proportion of four ounces of zinc and two ounces of salt to the gallon.

Two parts of carbolic acid and one part of fresh chloride of lime to a hundred parts of water.

Boiling for half an hour affords efficient disinfection.

For discharges, utensils, corpses, etc. — Five parts of carbolic acid and four parts of chloride of lime to one hundred parts of water.

For privies, sewers, outhouses, etc. — The stronger solution of carbolic acid and chloride of lime, or chloride of lime in powder.

Sulphate of iron (copperas), two pounds to the gallon of water.

Reliance should not be placed upon any of the secret proprietary disinfectants.

For fumigation. — Roll sulphur burned [over a tub containing water] in the proportion of three pounds for every thousand cubic feet of space; the rooms being tightly closed.

SPECIAL RECOMMENDATIONS.

The State Board of Health recommends that in whatever city, village or town Small-pox appears, the entire neighborhood in which there has been any communication with the patient, or exposure to the contagion, shall be notified that the *State Board as well as the local Board of Health requires that every person shall be protected by Vaccination;* that whatever materials are infected shall be destroyed by fire or shall be kept in a disinfectant solution and be boiled without removal from the premises; that rooms and furniture suspected of contagion shall be fumigated with sulphur as directed by this Board's rules; that tramps and other persons suspected of infection with Small-pox shall be taken in charge by the police and the sanitary authorities; that **employers shall advise their companies of employed persons to be vaccinated;** and in case of Small-pox in their vicinity, to make such vaccination one of the conditions of being continued in employment. This rule should be strictly enforced in all manufactories that make goods which are liable to become infected, and especially should be a standing regulation in public houses and in all classes employed on railroad trains and passenger vessels.

FORM OF REPORT TO THE STATE BOARD OF HEALTH AND TO THE LOCAL BOARD.

(Name and age)

.....is sick with Small-

(Name of house and place)

pox (or varioloid) at..... The

(Date)

eruption began.....

It is believed the contagion was taken at.....

by exposure to.....

Number of Persons now exposed to Patient.....

Who has the responsible care and custody of the case?.....

(Signed).....

(P. O. address).....

REQUEST:

Such a notice, with the request that needs to be made, should be sent to the Health Officer or the nearest member of the local Board of Health. If the physician is already in attendance, he should sign it; but if no physician has reached the patient, the householder and any other person that has charge of the case should sign this first report and request, and send it to the family physician or to the Health Officer. The physician who first sees the case, or the Health Officer, should write out such a brief report and his own request, and send it by mail to the Secretary of the State Board of Health.

MEMORANDUM OF RULES TO BE ADOPTED TO PREVENT THE SPREADING OF CONTAGIOUS DISEASES IN SCHOOLS.

The following sanitary rules are recommended by the State Board of Health for adoption by all School Boards and Trustees. They are presented in a form suited for direct transfer to the Public School Regulations, with the exception of the bracketed [ ] portions, which may depend on local circumstances for their application or feasibility:

I. Every person entering the public schools of ..... must give satisfactory evidence of protection against Small-pox, or be excluded until the rule is complied with, as provided by the Statute of 1860. [See synopsis of this Statute as appended.]

II. The fact of vaccination and protection should be entered with each name on the school record [and on transfer or promotion lists, so as to avoid further inconvenience to the pupil].

III. Persons affected with Diphtheria, Measles, Scarlet Fever or Small-pox, must be excluded from school until the School Officers' permission is granted.

IV. Intercourse between the school and family or house where there is a case of any one of these contagions, must be forbidden until the official permission is given.

V. It will be the duty of every teacher and school officer who discovers a case of any of these contagious diseases to cause the fact to be immediately reported to the local Board of Health. [The Board of Health should assume the sanitary duty of quarantining and disinfecting, as well as that of permitting the pupil's return, etc.]

VI. If a child is ascertained to have attended school while affected with any of these contagions, the local Board of Health shall be requested to direct the proper disinfection of the school premises. In the absence or delay of such sanitary authority, the physician in attendance, with one of the school officers, should direct this duty in accordance with the Rules for Disinfection and Cleansing given by the State Board.

VII. Rule III must invariably include all persons from the family where the case of sickness exists. [It should extend, also, to all persons living in the same house at the discretion of the local Board of Health.]

VIII. [It is desirable that all cases known to the Board of Health should be at once reported to the school authorities; and the latter should request the Board of Health to do so; and every teacher and school officer not only should promptly inform the Health authorities of each known or suspected case of contagious disease, but should endeavor to have the sanitary rules enforced, and give proper information to the families concerned.] In such instances the duties of all these officers and persons are reciprocal, and none can prudently be neglected.

SYNOPSIS OF THE STATUTES RELATING TO CONTAGIOUS DISEASES IN TOWNS AND SCHOOL DISTRICTS.

The Statute (chapter 438, Laws of 1860) makes the following provisions:

1. The trustees of school districts, and the school boards, are empowered to exclude from the public schools all unvaccinated persons until they are vaccinated.

2. This power may be exercised by trustees or boards, after passing a resolution to that effect, and posting a notice for at least ten days in two or more conspicuous places within the limits of their respective school-board or district organizations Such notice should offer free vaccination to those unable to pay.

3. The trustees or Board are further empowered to employ and pay a physician, who shall make a list of all persons within the school ages that have not been vaccinated, and provide with certificates of vaccination those persons whom the said trustees or Board directs. [The local Board of Health is required, under chapter 270, of 1885, to supply all the necessary means for gratuitous vaccination, and it is declared to be its duty *to make all needful provisions for immediately obtaining the necessary means for thorough and safe vaccination of all persons within the said jurisdiction who may need the same.*]

4. The amount expended is to be included in the annual tax bill. [The new law enables the town, village or city to meet the expense by its local Board of Health.]

5. The trustees of school districts are required to include in their annual report the number in their several districts between the ages of five and twenty-one who are vaccinated, and the number not vaccinated. [Every local Board of Health should require compliance with this law.]

STATE BOARD OF HEALTH OF NEW YORK.

ALBANY, , 188 .

To the President of the Board of Health of :

At a recent meeting of the Civil Service Commissioners, the following resolution was adopted and transmitted to this office:

"That inasmuch as only a limited number of health officers has been appointed and examined under the civil service rules, and the necessity for promptly filling all of those positions seems to be urgent, and the State Board of Health appears to be the proper body to take the initiative; therefore the Civil Service Commission respectfully requests the State Board of Health to urge all local health boards to take immediate steps for the appointment of qualified health officers in all localities where appointments have not already been made."

In pursuance of the above request, I beg to notify you that your board is required to forward to the office of the Civil Service Commission, at Albany, the name and address of the person chosen by you for the position of health officer, in order that arrangements may be made to determine his competence.

Under the civil service rules, your board can either name one physician for non-competitive examination, or two or more for competitive examination. No appointment otherwise made is valid.

ALFRED LUDLOW CARROLL, M. D.,
Secretary and Executive Officer.

EFFLUVIUM NUISANCES.

EFFLUVIUM NUISANCES.

The committee on effluvium nuisances submits the details of the work undertaken by it during the past year. A careful surveillance over the operations of the factories on Barren island and Newtown creek has been maintained, and special investigations made in response to petitions. A great mitigation of the offensive effluvia was effected during the summer by the suspension, during the warm months, of the super-phosphate works of Messrs. Coe & Co.

A complaint was received from Sheepshead Bay on the 8th of June to the effect that the drainage from the hotels at Sheepshead Bay and Coney Island was rapidly filling up the bay and polluting the lands and wells. This being properly a local matter, the communication was referred to the local board of health for examination. A very full return was made by the local board, which shows their entire ability to deal with the question.

On the 10th of June petition was received from citizens of Brooklyn complaining of a nuisance from Newtown creek. The subject was called to the attention of the board of health of Newtown. A State inspector was also sent to look into the merits of the complaint. He found that the nuisance was caused by a large quantity of fresh bones that were allowed to be exposed to the air and flies, and also to pouring into the air of gases from the retorts in which the bones are distilled. Remedies were suggested by the inspector, and a promise secured that the nuisance would be abated.

The condition of the factories on the island is shown in the inspector's report dated July 2d. Various improvements were noted: Steinfel's super-phosphate works had suspended for the summer months. The open platforms for the storage of fertilizers had been replaced by suitable sheds and a general cleaning up had been effected. The only serious nuisance then remaining arose from the delay in transferring loads of dead animals from the boats to the cooking vats. This can only be overcome by the quick handling of such material on its arrival.

Inspector Bartley, under date of August 14th, notes the improved condition of the factories, and the abatement of a nuisance in the bone-burning establishments of Mr. C. Meyers, Jr., and Messrs. Moller & Co., caused by an abortive attempt to destroy the gas from their retorts, in which the bones are charred, by conducting it into

the main chimney. The remedies suggested were the forcing of the gas into the fire by means of a steam aspirator. This method was adopted with success.

Inspector Hollick, in noticing the transformation wrought on the island by the constant supervision of the board's inspectors, says that a visitor would hardly recognize the island to-day as the same place it was five years ago. Later, on October 20th, it was found that Moller had discovered that the method of disposing of the residual gases, by conducting them into the furnace as above noted, cooled the fires, and a change was effected whereby the gases were conducted behind the fire, where they were not consumed. The old nuisance was again felt. The opinion of the Attorney-General was sought as to how Moller might be forced to abate the nuisance. A decision was rendered to the effect that the local board of health of the vicinity had ample power in the premises. The inspector, however, obtained the promise from Mr. Moller that he would introduce certain specified improvements which would secure the desired end, so that a resort to a legal remedy was rendered unnecessary for the present.

The pollution of Newtown creek by the sewage of a portion of the city of Brooklyn, and by the discharge into it of more or less of the tarry wastes from the factories situated along its banks still remains. The proposed new sewer for Brooklyn, however, is expected to work a vast improvement in this respect. On the whole, it is gratifying to the committee to note the success of its efforts during the past year, and to witness the vast results accomplished since the committee was first appointed.

The chairman of the committee on effluvium nuisances, in regard to Barren island, against which complaints have been made, requested the inspector, Mr. Arthur Hollick, to visit and examine the six most offensive establishments upon the island and to report to him, for the information of the State Board of Health, the result of his investigations. Mr. Hollick's report will be found annexed.

The chairman also visited in person the proprietors of the leading manufactories and contractors, causing and producing the offenses on Barren island, of which complaints in past and present time have been made, and has requested them to put upon record the precise work in which they were engaged and in regard to which they were assured that the spirit and letter of the State Health laws would be observed and proper performance of work would be exacted by the Board in the common interest of the people upon the island and the community at large. The communications, as far as received, will be found annexed.

Mr. Coe promises to suspend his work during the warm months of this year.

ERASTUS BROOKS,
Chairman.

APPENDED DOCUMENTS.

State Board of Health of New York,
Bureau of Chemical Analysts,
New Brighton, *June* 3, 1885.

Hon. Erastus Brooks:

Dear Sir — According to your instructions I have this day visited Barren Island. The small steamboat that plies between the island and Canarsie is running four trips per day, but is to be taken off next Tuesday for repairs, and will not resume for about ten days from that date.

I ascertained that Mr. Harrison is the public school teacher on the island, which is included in the town of Flatlands.

The date of my detailed report upon Barren Island is October 31, 1884, to which I would respectfully refer you for general information. The following memoranda in regard to the six establishments located there were taken to-day:

Coe's Fertilizer Works.

E. Frank Coe, 16 Burling slip, promised last autumn that they would cease mixing this summer as during previous summers. Have as yet obtained no hint in regard to the matter. April 2d, of this year one of the boilers blew up, killing two men and wrecking part of their plant; the resulting fire was put out by the copious use of "sludge acid," which has left things in a rather poor condition.

White's Offal Rendering Works.

P. White's Sons, 41 Peck slip. The only change made has been to build a shed for the storage of their meat scrap. This is in the nature of an improvement, as it prevents the scrap from being acted upon by sun and rain. As they still have the contract for removing the dead animals and offal from New York city I suppose that their establishment will be the same inevitable nuisance that it always was.

Steinfels' Fertilizer Works,

B. Steinfels, 182 Front street. All their work is done in the open, on exposed platforms and is certain to be very offensive in hot weather. It would be well to insist upon adequate cover being provided, in the form of sheds, for the proper storage of their material. I understand that it is proposed to enlarge the business considerably this year. Hawkins and Friedlaender's fish factories remain exactly the same as when I reported last autumn. Fishing was commenced this year on the 18th of May.

McManus' establishment is in the nature of an experiment station. It is a small plant, consisting of a boiler and still. Last year Mr.

McManus experimented upon sludge acid — trying to distill an oil from it. This year he is engaged in distilling offal, trying to make sulphate of ammonia. The entire place is too small to be of any consequence.

The three first named are the ones from which most of the offense arises. Of these Coe will probably cease mixing during the summer, White has already ceased, and Steinfels has done nothing whatever toward lessening or removing the nuisance he creates.

Very respectfully yours,
ARTHUR HOLLICK.

NEW YORK, *June* 6, 1885.

Hon. ERASTUS BROOKS, *West New Brighton, Staten Island, N. Y.:*

DEAR SIR — For the past five years we have endeavored to conduct our business upon Barren Island in such a manner as to be the least nuisance possible to any one, and especially during the summer months, and to that end we have stopped the objectionable portion of our works for that time, at great expense to us. This year we shall stop as usual, which we trust will be satisfactory to your honorable Board.

E. FRANK COE,
J. D. FAIRCHILD.

NEW YORK, *June* 12, 1885.

Hon. ERASTUS BROOKS, *State Board of Health:*

DEAR SIR — In answer to your inquiry concerning our method of disposing of the dead animals, butchers' offal, etc., received by us under our contract with the city of New York, we would state: All the dead animals, butchers' offal, etc., are removed daily at nine A. M., from our dock foot of West Thirty-eighth street, by steamboat to Barren Island, where they are unloaded within one hour after arrival, and by six P. M. of same day the entire load is disposed of in steam-tight tanks. Our entire factory is thoroughly sprinkled with disinfectant three times each day, the cutting-up floor flushed and washed down, and all the offal boxes and barrels in which the offal is received are disinfected and whitewashed before returning them. The material we handle is a nuisance before we receive it, and our best endeavors are directed to remove and take care of it in the least offensive and objectionable manner.

Very respectfully,
P. WHITE'S SONS.

To the State Board of Health, Albany, N. Y.:

The undersigned, citizens and tax payers of the city of Brooklyn, several of whom were your petitioners a year ago, desire again to call your official notice to the vile and nauseating odors which pervade this portion of the city, coming from the bone-boiling and bone-burning

establishments, just outside the city limits, at Newtown creek and Grand street.

Upon your official order, June, 1884, the matter of our complaint was referred to the chemist of your honorable Board, and he was satisfied, and reported accordingly, that the stenches came from the source already mentioned.

During the winter the unpleasant smell was not so frequently noticeable, but of late, when the wind is from a north-easterly direction, the odors are disgusting in the extreme. Probably several hundred thousand persons are annoyed, and many injured in their health from this cause. During the evening and night the smell is so intolerable as to necessitate the closing of windows, which seriously interferes with proper ventilation.

There is reason to believe that many families had supposed these noxious odors to arise from defective plumbing in their dwellings, and have been put to needless and unavailing expense in their attempts to escape the annoyance.

If this nuisance is allowed to continue, it will render a very considerable portion of the city undesirable as a place of residence, and thereby greatly depreciate the value of real estate in a neighborhood which is rapidly growing in population and wealth, and now gives promise of more rapid growth from increased facilities of rapid transit, arising from the completion and opening of the Brooklyn Elevated railroad.

In view of the fact that we have long suffered from the cause already described, and fearing the near future may bring to us fatal epidemic of disease, we respectfully petition that your honorable Board give the matter immediate attention, and that, if necessary, you invoke the aid of the chief executive of the State in *promptly* and *permanently suppressing* this *terrible nuisance.*

Dated BROOKLYN, N. Y., *June* 10, 1885.

Walter B. Chase, M. D., 636 Willoughby avenue.
J. A. McCorkle, M. D., 149 Clinton street.
Lewis R. Foote, 523 Willoughby avenue, Pastor of the Throop Avenue Presbyterian Church.
Thomas J. Atkins, 631 Willoughby avenue
T. C. Packer, 100 Sumner avenue.
Darwin R. James, 282 Throop avenue.
George R. Howler, M. D., 457 Marcy avenue.
J. Hyatt Smith, 109 Hart street.
Alexander Hutchins, M. D., 796 DeKalb avenue.
Henry Heath, 142 Macon street.
George M. Nichols, 277 Adelphi street.
W. C. Bowers, 483 Washington avenue.
George G. Collins, 301 Throop avenue. } *Aldermen.*
R. L. Scott, 897 Greene avenue.
John M. Quintard, 431 Greene avenue.
Hosea O. Pierce, 655 Willoughby avenue.

Ira C. Cook, 691 Willoughby avenue.
Robert Henderson, 686 Willoughby avenue.
Henry A. Phillips, 843 Willoughby avenue.
B. W. Bradley, 503 Willoughby avenue.
N. J. Gates, 636 Greene avenue.
Philip Krieger, 896 Myrtle avenue.

DURHAM, N. Y., *June* 12, 1885.

To whom it may concern:

My house is at 523 Willoughby avenue, Brooklyn, N. Y. I was confined to my room by reason of severe illness for seven weeks, beginning April 20. Frequently during the month of May, beginning at night-fall, the stench coming from the nuisance complained of was so great, the air was so offensive and stifling, as to cause positive discomfort; on this account I was compelled on a warm summer night, in the confined air of a sick-room, to raise the question of closing the windows to escape this foul odor that would otherwise fill my room.

LEWIS R. FOOTE,
Pastor Throop Avenue Presbyterian Church.

June 20, 1885.

A. L. CARROLL, M. D., *Secretary State Board of Health, Albany, N. Y.:*

DEAR SIR — I send you by this post, under another cover, a petition asking your honorable body to take immediate steps to suppress the nuisance of bone-boiling and bone-burning at Newtown creek and Grand street.

The community feel that they are entitled to relief, and confidently appeal to you for it, desiring, so far as consistent with the proper conduct of your affairs, that you keep us informed as to what you are doing in the premises.

I have no reluctance in saying that the gentlemen who have signed the petition are among the leading citizens of the city. Representing the medical profession is Dr. Alex. Hutchins, late president Medical Society State of New York, Dr. James A. McCorkle, president Medical Society county of Kings, and Dr. George R. Fowler, surgeon to St. Mary's Hospital. Hon. Darwin R. James, M. C., and Rev. J. Hyatt Smith, late M. C., General Henry Heath, member of Assembly from this district, John C. Cook, late president New York Metal Exchange, Supervisor L. W. Beasly, and five of the aldermen of the city, together with Mr. H. O. Pearce, Rev. L. R. Foote and other gentlemen, several of whom represent large financial and commercial interests.

You will understand the annoyance sick people suffer, from the letter of Rev. Mr. Foote; the truth is the stench is so intolerable that well people are frequently at night compelled to close their windows.

Many other names could have been added to the petition, but with the knowledge you already possess, it seems all that is needed is *action* on the part of *those in power*, to whose *just* and *prompt action* we appeal.

Hoping for an early acknowledgment, I am, sir, yours truly,

WALTER B. CHASE.

P. S.— You have probably received from Dr. Raymond, health officer of the city, before this date, a letter setting forth his views of the needs of the situation.

W. B. C.

INSPECTION OF NEWTOWN CREEK.

STATE BOARD OF HEALTH OF NEW YORK,
ALBANY, *June* 30, 1885.

To the Supervisor of Newtown :

DEAR SIR — Some days ago a petition was received at this office from a large number of influential citizens of Brooklyn, complaining of alleged nuisances emanating from bone-boiling and bone-burning establishments, just outside their city limits, at Newtown creek and Grand street.

In response to this petition Dr. Bartley has been deputed by this Board to verify the causes of complaint, but as the matter lies within your jurisdiction, I trust that your board will co-operate with him in an investigation, and, if nuisances be found to exist as represented, that you will take prompt measures for their abatement.

Faithfully yours,

ALFRED LUDLOW CARROLL, M. D.
Secretary.

BROOKLYN, N. Y., *July* 2, 1885.

Dr. ALFRED L. CARROLL :

DEAR SIR — In accordance with your instructions, I visited the region along Newtown creek in company with one of the complainants of this city, who identified the odor complained as that produced by Mr. Meyer's and Mr. Moller's fertilizer works.

After consultation with the complainants, by appointment, I thought this the best plan to fix the location of the offending parties. I find two causes for the nuisance complained of, viz.: A large quantity of fresh bones allowed to lie exposed to the air and flies for weeks; also, the pouring into the air of the gases from the retorts in which the bones are distilled. These gases are, in my opinion, the chief source of the trouble. After passing the gases through condensers, such as are used in ordinary gas-houses, they are forced through a tank containing sulphuric acid to collect the ammonia. They are then conducted through a long flue to the chimney, which they enter at about ten or twelve feet above the fire. This is evidently an ineffectual attempt to burn the gases.

At my suggestion, both these gentlemen promised to so change the apparatus as to force these residual gases into the fire itself, and thus completely consume them. By the aid of a steam blower this can be done with very little expense, and they signified their entire willingness to make the change immediately. I have already communicated the result of my visit to the complainants, and I have no doubt that the trouble can be remedied without any other action than our advice. They also promised to remove the bones spoken of above, and hereafter to work them up as they come in. I shall make another inspection as soon as convenient, and report to you the results.

Very respectfully yours,
E. H. BARTLEY, M. D.,
Inspector.

DRAINAGE AT SHEEPSHEAD BAY.

SHEEPSHEAD BAY, *June* 6, 1885.

To the Honorable Board of Health:

DEAR SIRS — Your attention is respectfully called to the drainage at Sheepshead Bay, and also to the Manhattan Beach and Oriental hotels' artesian well, or water supply at this place. The New York *Herald* has had a communication from me in reference to this subject for one month, but for some unseen reason hesitates to publish the same. The drainage from the hotels at Sheepshead Bay and Coney Island is rapidly filling up the bay, and polluting the lands and wells surrounding it, and if something is not speedily done in reference to the matter, disease and ruination stares this place in the face. The local board of health seems powerless, except so far as expensive sewerage is concerned, which, in case of our acceptance of the same, they have given us to understand, that we can sewer in the bay contrary to law, and the complaints, if any are made, can be referred to them. I inclose a communication from one of the *Herald* staff which will give you some idea of the existing state of affairs, he having engaged rooms at the St. Elmo, and properly canceling the engagement after personally inspecting Sheepshead Bay, thereby backing up, as he says, their reporters' own views. The Manhattan Beach water supply, or artesian well, is surrounded with water-closets and sink-drains, twelve of which belong to tenement and store property, and these are as close as seventy-five feet, and all within 150 feet of the pump, which supplies Manhattan Beach and Oriental hotels.

Yours respectfully,
E. A. MASON,
St. Elmo Villa, Sheepshead Bay, L. I.

On June 8, a copy of the above complaint was forwarded to the local board of health and a report of the facts asked for.

Return made by the Local Board of Health.

GRAVESEND, N. Y., *July* 23, 1885.

To the Honorable, the State Board of Health at Albany, N. Y.:

GENTLEMEN — Concerning the charges against the health of Sheepshead Bay and Manhattan Beach water supply, the Health Officer, R. L. Van Kleek, has made the following report with analysis attached:

To the Honorable Board of Health, Gravesend, N. Y.:

GENTLEMEN — The complaint of E. A. Mason, forwarded to you by the State Board of Health and referred to me at your last meeting for investigation and report, has received consideration, and I would respectfully submit the following report for your consideration and action.

The complaint alleges: First, that the drainage from the hotels of Sheepshead Bay and Coney Island is rapidly filling up the bay; and, secondly that the water supply of Manhattan Beach is rendered dangerous by being surrounded by water-closets and sink drains; twelve of which belong to tenement and store property, and these are as close as seventy-five feet, and all within 150 feet, of the pump which supplies the Manhattan Beach and Oriental hotels.

The first allegation is evidently made without any examination whatever into the facts of the case by the complainant, and will be dismissed with a very few words.

I have at different times within the last few years, and as lately as June 1, made personal inspections of nearly all the sewers emptying into the bay, and I have failed to find one instance when solids are allowed to run therein; and neither has a single complaint prior to the present one been made within the last two years in reference to this subject.

The second allegation has involved not only an inspection of all the privy vaults and cess-pools within 200 feet of the wells referred to, but also a chemical analysis of the water.

The distance of these water-closets and cess-pools from the wells is as follows:

The nearest water-closet is 50 feet; the next is 90 feet; the third is 100 feet; the fourth is 115 feet; the fifth is certainly 150 feet; the sixth, 200 feet.

The nearest cess-pool is 140 feet distant; the second cess-pool is 166 feet; the third is 186 feet; so within 75 feet we have but one water-closet instead of twelve, as alleged by the complainant, and within 175 feet we have four additional ones, besides two cess-pools.

All these vaults and cess-pools are, at present time, in good condition, and I find no violations of your regulations in regard to them.

The wells supplying the beach are situated on the east side of the railroad track; the first one is 30 feet north-east of the pump-house; the tenth one and last is distant 287 feet in the same direction; they are constructed with special reference of preventing contamination in the most approved manner, and are all 30 feet deep. When they were constructed there was not a single dwelling within 1,000 feet, and the company had no reason to suppose that there would be a dwelling near them for a long period of time. But within the last three years about twenty-five buildings have been erected within 500 feet of the pump-house, and it is possible that each year will see more buildings erected in this locality. All these buildings and in fact all Sheepshead Bay village, containing in the summer season 2,500 individuals at least; are supplied with water from wells half a mile to the north, and pass through the ordinary size iron pipes. The supply is unlimited, but there is no corresponding sewerage, and this will make soil-saturation with decomposing waste absolutely certain.

As the complainant refers to the health of Sheepshead Bay that it is threatened, let me call your attention to the following facts: During 1884 there was one death on Manhattan Beach, and this was due to heart disease, and but one death at Sheepshead Bay that could even indirectly be attributed to disease contracted through filth, and probably the disease was contracted elsewhere than in this village. The ratio of deaths to the population is no larger here than in any other district of the town.

To conclude, I would report: First, that the bay is not filling up by drainage from the hotels of Sheepshead and Coney Island; second, that the water supply to Manhattan Beach is not contaminated, as shown by analysis. I would recommend, however, the removal of the wells within 200 feet of cess-pools and vaults to a point further distant to prevent any possible contamination in the future, and I would recommend some system to carry off the water caused by a liberal water supply to prevent soil-saturation.

Respectfully,

R. L. VAN KLEEK,

Health Officer.

Since writing up the above report I have been informed that the Manhattan Beach Improvement Company intends, this autumn, to remove their wells to a point distant about one-fourth to one-half of a mile north of their present location.

R. L. VAN KLEEK.

NEW YORK, *July* 2, 1885.

Result of analysis of a sample of water marked "Manhattan Beach Supply," drawn and sealed by our agent, June 30, 1885, at Sheepshead Bay:

	Grains in U. S. gallon.
Odor when heated to 100 degs.	none
Chlorine	2.188
Phosphoric acid	trace
Nitrogen in nitrates	.020
Free ammonia	.001
Albuminoid ammonia	.002
Hardness	5.500
Total solids	8.750
Organic volatile	3.500
Mineral	5.025

According to chemical standards the water is a good drinking water.

Respectfully,

STILLWELL & GLADDING,

Chemists to the New York Produce Exchange.

The following resolution was then adopted, to-wit:

Resolved, That the report of the health officer be received, and that the secretary of this board be directed to forward a certified copy of the report to the State Board of Health, at Albany, N. Y.

Adopted July 2, 1885.

I, John L. Voorhies, secretary of the board of health of the town of Gravesend, county of Kings, State of New York, hereby certify that the within is a true copy of a report from the health officer of said board of said town, presented to the board at a meeting of said board held July 2, 1885, as the same appears upon the minutes of the proceedings of said board.

[L. S.] JOHN L. VOORHIES,

Secretary of the Board of Health and Town Clerk of Gravesend, N. Y.

INSPECTION OF BARREN ISLAND.

STATE BOARD OF HEALTH OF NEW YORK,
ALBANY, *July* 2, 1885.

The inclosed report from Mr. Hollick shows the condition of affairs at Barren Island at the present time. It was the opinion of the committee that the manufacturers were endeavoring to comply with the previous recommendations of the State Board of Health in carrying on the business in as inoffensive a manner as possible.

J. SAVAGE DELAVAN, M. D.,

Chairman.

NEW BRIGHTON, N. Y., *June* 30, 1885.

J. SAVAGE DELAVAN, M. D., *Chairman Committee on Effluvium Nuisances:*

SIR — According to instructions from you I beg leave to submit the following memoranda noted during our visit to Barren Island, to-day:

At Mr. E. Frank Coe's fertilizer works, all operations, except shipping the finished material, had ceased. The sludge acid tanks were empty, and the manager, Mr. Fairchild, stated that the last mixing had been done on the twentieth instant, when the works were shut down for the summer. The factory is now in process of "cleaning up" and work will not be resumed until September, according to Mr. Fairchild's promise. This I understand is done voluntarily, with the desire to avoid any nuisance that might arise during the hot weather from the souring of sludge acid.

The fish factory of Hawkins Bros. was working at almost its full capacity. The present season has not been a good one for curing the fish, as there has been but little clear hot weather; in this business the main desideratum is sunshine, and but very little nuisance will arise if the scrap is quickly cured.

The fertilizer works of B. Steinfels were in better condition than at any previous time since the works were started. Last summer all work was done on open platform, and the material was piled in heaps in the open air. My visit to the island on the third instant seemed to have a good effect, for sheds have been erected in which to store the fertilizers, and Mr. Steinfels has followed Mr. Coe's example in regard to stopping work during the summer; he says that his last mixing was done on the tenth instant, and that he does not intend to resume until September; the annexed letter in regard to the matter will explain itself.

At White's offal rendering place, every thing was as clean as possible, but the inevitable nuisance was apparent when the boat arrived with its load of dead animals, etc.: the worst effects are felt while the load is being transferred from the boat to the cooking vats, and every thing should be done to facilitate quick handling of the material as soon as it arrives. The fish factory in connection with it, also Friedlaenders' fish factory, were in about the same condition as Hawkins Bros.' It is to their advantage that all fish scrap shall be well cured, as wet or sour scrap will breed insects, besides being liable to spontaneous combustion if mixed with dry scrap and stored in bulk in a hot place.

In conclusion I would state that the general condition of the island and its industries is far better, from our point of view, *than at any time during last summer*, and if the responsible parties continue to act during the summer in good faith, as they seem to intend doing, there will be no very serious cause for complaint.

Very respectfully, etc.,

ARTHUR HOLLICK,

Inspector.

NEW YORK, *June* 25, 1885.

Mr. A. HOLLICK:

DEAR SIR — We have noticed your complaint in the Brooklyn *Union*, which states that the work is done on the platform; such has been stopped since June 10th. We have finished our manufacturing of fertilizer for this summer, and have it all ready in sheds for shipment to our trade. You will find every thing to your entire satisfaction, and we try to have every thing clean and nice.

Yours very respectfully,

B. STEINFELS,
Manager.
Per E.

BROOKLYN, *August* 14, 1885.

Dr. ALFRED L. CARROLL, *Secretary State Board of Health:*

DEAR SIR — Some weeks ago I had the honor to submit to you a preliminary report upon the nuisances created by certain factories, situated on Newtown creek. In that report I stated that I believed the odors came from the bone-burning establishments of Mr. C. Meyer, Jr., and Messrs. Moller & Co. Further examination and repeated inspections have confirmed that opinion. The owners of these factories had made an attempt to destroy the gases from their retorts, in which the bones are charred, by conducting them into the main chimney; this was soon demonstrated to be ineffectual, as the gases were poured into the chimney ten or twelve feet above the fire-box in both factories. I then requested them to try the method of forcing the gases into the fire direct, by means of a steam aspirator. After considerable delay, owing in part to my absence from the city for a few weeks, my suggestion has been carried out, with the effect, it is hoped, of entirely destroying the odors heretofore complained of.

Another cause of considerable odor has also been remedied, viz.: the practice of allowing the fresh bones, after being boiled to remove the fat, to lie in a pile for weeks at a time. These piles, at the time of my first visit, were very offensive, and were found in large quantity. This practice has been stopped and the bones are now separated from the meat at once, and worked up as soon as they can be dried sufficiently. With these improvements, the odor has been reduced to the minimum, and I hope will give no further trouble.

The results attained have been communicated to the citizens signing the complaint, through Dr. Walter B. Chase, with a request for a report from them to me, in case of further trouble from this source.

I wish to express my thanks to the committee of the Newtown board of health, for their co-operation and determination to do what lies in their power to abate these nuisances.

I shall continue to visit the various establishments in that neighborhood from time to time, and in this way we may be able to keep these odors in subjection.

Very respectfully submitted,

E. H. BARTLEY, M. D.,

Inspector State Board of Health of New York.

FURTHER INSPECTIONS, REPORTS AND RECOMMENDATIONS.

The committee on effluvium nuisances, after examination of the report of Mr. Arthur Hollick, inspector for the State Board of Health, concur in his recommendations. The report carefully sets forth the grievances complained of, and the causes of the offenses. As these causes can be promptly removed it is the duty of the committee to urge and insist that the proprietors, Messrs. J. & C. Moller, at once proceed to change the methods producing the nuisance set forth in the petition placed before them and fully pointed out by Inspector Hollick. These remedies are both simple and inexpensive, and once made and maintained, cannot fail to secure the improvements asked for.

ERASTUS BROOKS, *Chairman.*

STATEN ISLAND, *December* 28, 1885.

STATE BOARD OF HEALTH OF NEW YORK,
NEW BRIGHTON, N. Y., *Sept.* 28, 1885.

HON. ERASTUS BROOKS, *Commissioner N. Y. State Board of Health:*

SIR — The following is a brief report upon Barren Island and the condition of its industries during the past summer:

Inspections were begun on July 1, and were continued twice or three times a week, until September 21.

The agreement made by Mr. E. Frank Coe, to cease mixing fertilizers during the summer, was continued in good faith between the above dates, and I am happy to add that the good example was followed this year by his neighbor, Mr. Steinfels. By reference to my report of October 31, 1884, it will be seen that the establishment of Mr. Steinfels was formerly a source of great annoyance, and the improvement is a gratifying sign of the desire on the part of the manufacturers to do what they can to mitigate the evils incident to their works. Mr. Steinfels has also placed all his stock under cover, which is another decided improvement over the old method of allowing it to remain exposed to the elements.

There has been no change in the fish factories, the work being done in the same manner as before. But very little nuisance is occasioned by them, especially if the weather is hot and dry so that the fish scrap can be quickly cured. Wet weather delays the work and stock is liable to accumulate and become sour. There is yet one establishment that is capable of considerable improvement, namely,

White's. The arrangements for handling the offal as it arrives, and its subsequent treatment, are admirable, but no adequate provision has been made for the storage of the material after treatment. Large heaps of partly liquid and decaying scrap were lying in sheds, and other offal was piled on the open ground outside. Some means should be provided for drying all the scrap before storing, and no offensive matter should be retained for any length of time without proper disinfecting, deodorizing and covering. If this establishment could be improved as much as the others have been I think that we could expect but very little more of Barren Island. The constant supervision has had a very appreciable effect in the mitigation of the nuisance from year to year, and a visitor would hardly recognize the island to-day as the same place of five years ago. The manufacturers are all very anxious to obtain the good-will and opinion of the public, and as a rule will cheerfully act up to any suggestion made.

Mr. Coe commenced mixing on the 22d inst., but White and Steinfels say that they will not begin until the fish season is over — about the last of October.

Respectfully submitted,

ARTHUR HOLLICK,
Inspector.

NEW BRIGHTON, *December* 26, 1885.

HON. ERASTUS BROOKS, *Chairman Committee on Effluvium Nuisances:*

SIR — According to instructions received from you December 22, 1885, I have this day made an inspection of the factories and locality near the head of Newtown creek, to which the annexed report of Dr. Bartley refers.

From my inspections during the summer of 1884, and also from Dr. Bartley's report, I was pretty sure of the source of the greatest nuisance, and to-day's investigation has satisfied me beyond any doubt. The most far-reaching and penetrating odor is from the distillation of bones in the manufacture of bone black. There are three factories engaged in this industry, all of which have been reported upon and described in my previous reports. They are: Preston Fertilizer Company, Blissville; J. & C. Moller & Company, and C. Meyer, Furman's Island. The first mentioned may be considered as of no consequence, for the reason that they distill the bones in iron pots exposed directly to the fire, and nearly all the products of distillation, except at the commencement of the firing, are burnt. Whatever gaseous products escape are conducted into a tall chimney and carried into the higher strata of the atmosphere. Mr. Rowley, the superintendent, informed me to-day that they were considering the advisability of putting in retorts, so that the ammonia could be condensed and saved. I strongly urged him not to do so, as more or less nuisance would be sure to occur.

At the establishment of C. Meyer the bones are distilled in vertical retorts, and the products of distillation, consisting of ammonia and other gases and tar, are condensed and utilized. It is in the manipulation of these by-products that most of the nuisance occurs. Mr. Meyer has invented a method of burning the tar in the fires by means of a steam jet, making a fine spray of the material, which he claims to effect a saving of $1,000 per annum in fuel. And this product was formerly sold at a nominal price to any one who would take it away, or else it was carted out to some vacant land and burned when it could not otherwise be disposed of. The ammoniacal gases are treated with sulphuric acid, in order to form sulphate of ammonia.

The gases remaining after this operation are very pungent and characteristic in odor, and great care should be taken to properly consume them.

Mr. Meyer's former method was to conduct them into the chimney *above* the fire. This merely effected their distribution into the atmosphere from the chimney, and was of but limited value, as the chimney is low. The present method employed is to connect immediately into the fire, thus insuring the combustion of the gas. I understand that this improvement was made upon Dr. Bartley's suggestion, although I was informed about a year ago that it would not do, on account of the danger of a back draught causing an explosion. With proper attention to details, such as caulking all joints in the pipes thoroughly, fitting all covers and connections tightly, working the steam exhausts with care, etc., I am of the opinion that this establishment will be of but little nuisance except to its immediate surroundings. Mr. Meyer has always been ready to act upon any suggestion made to him, especially as he admits that every improvement, designed for the abatement of the nuisance, has paid financially.

The establishment of J. & C. Moller has not been managed with the intelligence that has characterized his neighbors. His method is essentially the same, consisting of distillation in retorts. The entire plant was rebuilt two years ago, but has been more or less a disappointment ever since. The method of using the tar is clumsy, being mixed with fine coal for the fires, or else removed from the premises in the most available way. The ammoniacal gases are treated as formerly described, but the residual gases are not properly consumed, and there is no doubt that most of the nuisance complained of is directly attributable to their escape. The conducting pipe is only made of galvanized iron, which soon corrodes and becomes leaky, requiring to be constantly renewed. It is connected in the back of the boiler fire, where the heat is insufficient to consume the gases. This fire is too great a distance from the ammonia vats to secure proper draught and exhaust. The ammonia vat or "saturator" and the pans are not properly covered. I suggested the following improvements, which Mr. Moller promised to make: First, to dispose of the tar in a manner similar to Mr. Meyer's;

second, to cover the "saturator" and pans with air-tight covers; third, to connect these by means of a cast-iron pipe, securely caulked, with the retort fire, at a point either immediately over the hottest part of the fire or else under the grate bars. These improvements I consider as absolutely requisite in order to effect an abatement of the nuisance.

I have so frequently referred, in my former reports, to the condition of the creek itself, that it seems like mere reiteration to say that the only permanent improvement will be to bulk-head and dredge throughout its entire length, so that there shall be no flats exposed at low tide. It is beyond hope that the water will ever be undefiled while it is bordered by such thickly-settled communities as Brooklyn and Long Island City. If the proposed new sewer for Brooklyn is carried out successfully, however, it will undoubtedly result in a vast improvement to the creek.

Respectfully submitted,

ARTHUR HOLLICK,
Inspector.

LEGAL ASPECT OF THE CASE.

STATE OF NEW YORK:
OFFICE OF THE ATTORNEY-GENERAL,
ALBANY, *December* 14, 1885.

Dr. ALFRED LUDLOW CARROLL, *Secretary State Board of Health:*

DEAR SIR — The communication addressed to you from E. H. Bartley, M. D., inspector, and by you referred to this office, has been duly considered by me.

Dr. Bartley's letter contains statements which are too vague from which to determine definitely that an actual nuisance exists which is detrimental or dangerous to health.

Providing, however, there exists a nuisance which is actually detrimental to public health in the locality designated and of the character specified, which nuisance is maintained by an individual or private corporation, the Board of Health has power to order its abatement in the manner prescribed by chapter 270, Laws 1885.

Very respectfully,
Your obedient servant,
D. O'BRIEN,
Attorney-General.

BROOKLYN, *October* 20, 1885.

Dr. ALFRED L. CARROLL, *Secretary of State Board of Health:*

DEAR SIR — I beg leave to submit the following statements in addition to my former report concerning the nuisances situated along and arising from Newtown creek. In my former report I expressed the hope that certain improvements made at my suggestion by two of the principal offenders would greatly improve, if not entirely

correct, the trouble. These changes consisted in conducting the residual gases from the retorts in which the bones are distilled after removing the tar and ammonia directly into the fire of the furnace and thus consume them. This did greatly improve matters, until one of the firms referred to, Moller & Co., found that this method cooled their fire too much, and made still another change. They took the gases to the furnace under their boilers, and forced them in entirely behind the fire where they are not consumed. Complaints soon began to come in until they are now of frequent occurrence. I have expressed my objections to the firm, and to the mechanic who put in the apparatus. This latter gentleman admits the inefficiency of the method as now arranged. As at present conducted this one factory, if not also Mr. Myer's, is, in my opinion, a *public nuisance* within the meaning of section 385 of the Penal Code of this State. Whether this kind of a business can be conducted in the vicinity of a large city without becoming a nuisance admits of considerable doubt. As the city of Brooklyn extends its residences toward this part of the creek, the time must soon come, if it has not already, when such a stench as now comes from these works cannot be tolerated.

Next in importance to the noisome odors emanating from these bone-burning establishments I would mention the pollution of the waters of the creek itself. Without attempting to mention all the sources of the pollution of this stream, I will mention the two principal ones. These are the sewage of a portion of the city of Brooklyn, and more or less refuse, tar, oil, etc., from the oil refineries along its banks. I have no positive evidence that sludge acid is poured into it, but at low tide a black, tarry, offensive deposit may be seen along its banks which is extremely suggestive of this origin. (See § 390, Penal Code.) The surface of the water is usually seen to be partially covered with a thin film of oil, sufficient to give the odor to the whole stream.

When there is added to this a large stream of city sewage, and more or less refuse from smaller factories, fertilizer works and fat-rendering establishments, the water becomes extremely dirty and offensive. The upper portion of stream flows through a large swamp covering many acres, much of which is under water at high tide, and bare at low tide. It is evident that the great area of sewage-soaked and polluted soil thus exposed to the air must give off a great deal of offensive odor. The air coming from these flats on a foggy or damp night with a gentle breeze is, to many, almost unbearable. Complaints have repeatedly been made that in certain regions not far removed from the creek the paint upon the houses becomes blackened by the same odorous gases. I have confirmed the fact that the houses are blackened by some atmospheric agency. I am of the opinion that a large part of this effect is due to the sulphuretted hydrogen and ammonium sulph-hydrate brought from these swamps and their polluted waters.

Further studies upon this point are in progress. The city of Brook-

lyn is at present constructing a sewer which, I am informed, is intended to carry the sewage of that part of the city in another direction, and thus prevent this very important pollution of the creek.

This improvement is very much needed, and little can be done toward the complete abolition of these odors until it is completed. Besides the causes already mentioned, we may also notice the five or six fat-rendering establishments, the two manufactories of fertilizers, and a glue factory, each of which adds something to the common stench. I have no proof, however, that the odors from these premises reach far enough to constitute a *public nuisance*. I doubt if any thing can be done at present with private corporations for polluting the creek waters, except in the case of the oil refineries, which are bound by a contract, so long as the city of Brooklyn is the chief offender.

As frequent complaints reach me concerning these nuisances, I would respectfully ask for your opinion as to what measures should be taken for their suppression.

Very respectfully,

E. H. BARTLEY, M. D.,
Inspector.

SCHOOL HYGIENE.

LIST OF ILLUSTRATIONS.

1 Converging ventilating flues, hooded, etc.....

2 Hooded exit shafts (direct to, and above, roof) ....

3 Stove and jacket, showing the fresh-air shaft-areas.....

4 Exits for foul air by stove-pipes and their jackets .....

5 Exits for foul air by stove-pipes and their jackets.....

6 Exits for foul air by stove-pipes and their jackets .....

7 Fresh-air inlets..... ....

8 Fresh-air inlets and ceiling exit..... .....

9 and 10 Rooms for imperceptible ventilation . .. .

11 A specimen of unventilated, overcrowded and poorly lighted school-rooms ....

12 The Yonkers examples of ventilation, etc.....

13 and 14 Special examples in the city of Troy .....

15 and 16 Examples of ventilation and lighting in the Court street and in the Francis street schools, Utica..... ....

17 Example in Rochester, school No. 13 .....

18 and 19 . Other examples in Rochester.....

20 and 21 Faultiness in sliding glass doors, illustrated .....

22 and 23 Illustrations of the treatment of windows in reference to suitable lighting ....

24 Illustrations of lighting in the Hoosick Falls public schools.....

25 Studies in the lighting and ventilation of public school No. 10, Rochester ....

26 Illustration of four school rooms on one floor, arranged in the four corners, the corridors and accessory rooms being all central....

27, 28, 29 and 30 Black-boards and the lighting of class-rooms.....

31 and 32 Examples in the Union School of Schenectady. .....

33, 34 and 35 Examples in lighting and ventilation in the Brockport Normal School. ....

36, 37, 38 and 39 Examples of faulty lighting in certain public schools in Rochester, Troy and Brockport..... . ...

40 Example in one of the Albany Public Schools.....

REPORT UPON SCHOOL HYGIENE.

By D. F. Lincoln, M. D.

Note. — During the course of the inspections which were made under the direction of the State Board of Health in 1881, the writer of these pages had opportunity to observe the actual condition of the school buildings in many widely distant places in the State of New York. The present paper is based chiefly upon these observations.

The first edition dealt chiefly with questions relating to the construction of school buildings, as ventilation, heating, lighting and desks. The present edition is essentially the same in these points, but has in addition some remarks and illustrations upon drainage, and a plan or two which may serve as models for building school-houses, or may at least offer suggestions and aids to those intending to build.

Besides these points something is also said in regard to the prevention of contagious diseases, and to the general question of the effect of school life and work upon health.

The writer's thanks are due to those teachers and guardians of schools who have sympathized with his work, and to whom he has tried to make it of practical use.

Introductory.

A human being, considered by itself, is a unit, and has value as such. In combination with others, it forms a part of a compound unit, a larger being, different from any of the individuals composing it, and endowed with special productive or destructive powers. But every thing has its price, and the gain is associated with a loss. The man who forms part of an association gives up some of his own individual rights. Tied to a machine, he becomes a part of it. Does the child lose any thing by being incorporated in the system of common schools? Doubtless he does.

A child who enters a public school is conscious of a change in his surroundings of which he cannot give an account, but which constitutes for him a new world. He has ceased to be an individual, and has become a fractional part of a machine. He has been well understood by persons who have watched him from his birth, and who are deeply interested in his person. He is now transferred to the care of strangers, who meet with him only five hours in the day, and whose interest in him is restricted by the fact that he forms but a fraction — say from one and one-tenth to two and one-half per cent — of the total group of children that

is intrusted to the care of a teacher. He is held by the teacher a few months, and then passed on to another, again as a fraction, not as an integer.* Does he not lose much, as well as gain something, in this system?

As regards his health, he loses that defense which the sympathy of the community always extends to an individual who is suffering conspicuously. Taken generally, all children in school are suffering some discomfort. Average the discomfort among ten thousand, and it may not be very great for each one. But a class of fifty children is not made up of fifty *averages*. Let us imagine such a class, containing among its members representatives of the common affections of school life, such affections and complaints as the writer of these lines has frequently had to encounter among the children in public schools. Individual number one has a ravenous appetite, sleeps soundly, works little, plays much. Number two is a little pale, eats less in term-time but recovers his appetite each vacation. Number three is detained at home occasionally for headaches, caused by poisonous carbonic oxide and carbonic acid gas, from the stove, or by the foul air of the crowd. Number four mutters arithmetic in his sleep, especially just before the annual examinations for promotion. Number five occasionally sits in a draught of cold air, and catches cold; while his next companion has a tendency to catarrh of the ear, and is gradually becoming deaf under the discipline of a school which confines him to one spot. Number nine is a child whose parents are near-sighted; he sits in a corner of a dark room, where light is insufficient for writing in the winter season; he is allowed to sit in an attitude that brings his eyes within three inches of the book, and he is placed in a desk which is so high and ill-adapted as to prevent him from holding the object at a proper distance. He is complained of as dull, listless, inattentive to what is written on the board, when in reality he is shut in upon himself by the fact of near-sightedness, which condition is aggravated every day by the way his education is carried on. Number twenty has just recovered from the measles, or perhaps we should rather say, is convalescing — for she is a little pale and weak, her eyes are not strong, and her eager nervousness hints at the reason for her premature return to study; she wants to be present at an examination, on which her "promotion" will depend.

Numbers thirty and forty-one wear glasses; one pair has been placed on the child's eyes by the most accomplished medical skill, for the relief of far-sight; the other has been picked up from a tramping pedler.

Now the classes are ordered to write. They begin in good form; but in three minutes' time their heads are bent within an average distance of three inches from the copy-books; and a distorted position of the body is inevitably produced by the faulty shape of the desks. These scholars, the teacher says, write about twenty minutes a day, and that cannot be long enough to inflict any permanent injury. But in another room they are adopting the "Quincy method," and the scholars write a good deal

* It would be very unjust to many faithful teachers to present this as the universal fact. There are many exceptions, local and personal; but the general tendency remains as stated.

more; and in the upper classes they write long translations and compositions, and copy out lectures.

In another room may be seen a class of boys and girls of about fifteen or sixteen. They pass in file, and there is opportunity for seeing that not one in ten of the girls has an erect figure; many stoop painfully, and among forty whom the eye reaches, four or five appear to be deformed with lateral curvature of the spine. Here is a tall young woman who sits, like others, with the upper part of her body across the desk in an attitude of fatigue. She is an overworked person, and the school is not wholly to blame for that. But the school may be responsible for the ill-shape of the back of her chair, which gives her no real support in sitting, and compels her to lean forward instead to relieve a pain in her back.

Such facts as these will constantly meet the eye of one who visits our common schools and studies the health of their inmates. And is there not an inference from such facts? Are they not of that class which imply a duty and a responsibility? Human life is the best of human possessions; and the best part of life is the hope that we are leaving behind us those who will be more able and worthy to enjoy it than we have been. These successors of ours are the children. Can any thing touch us more closely than the thought that there is a group of influences, manifold and wide-spread, which are constantly acting to lessen the worth of their young life?

Ventilation and Heating.

"How much?" and "How?" are the two great questions in ventilation.

Ventilation implies getting bad air out, and good air in. The amount of air discharged from the lungs is small. If we could catch it at once and make it pass out of doors, very little ventilation would be needed. But it is found that the breath mingles rapidly with the air in the room; and the only thing to do is to change the air of the entire room frequently. The change should be so rapid, that a person coming from the fresh air shall not notice closeness, or a close smell. In order to produce this result, in a house permanently dwelt in, sixty cubic feet of fresh air should be supplied per minute, for each occupant. In a house occupied for short times and then aired out by sweeping draughts, like a school-house, half this amount is desirable — that is, thirty cubic feet per minute, or half a foot per second.*

A room measuring 32 feet long, 25 feet wide, and 12½ feet high, contains 10,000 cubic feet of air, which allows 200 cubic feet per scholar to a class of 50 scholars. If one person is supposed to require 30 feet of fresh

* The amount of fresh air required is the amount which is needed in order to dilute the impure air to a certain standard of relative purity. All good air contains a small proportion (4-10000) of carbonic acid gas; when human breath is added, the amount is increased. It is found from experience that when this increase brings the total amount to beyond 6-10000, the air begins to smell close. A person may, therefore, add two parts of carbonic acid to 10,000 of air before it becomes objectionable. If he should breathe out two feet of the poisonous gas in an hour he would affect 10,000 feet of air to this extent; but as the real amount expired in an hour is about one-third of two feet, he uses and renders unfit for use one-third of 10,000 feet, or (more exactly) 3,500 cubic feet of fresh air per hour.

air per minute, then each one's allowance will last a little less than seven (7) minutes. Hence, the requirement is that in such a room the air should be changed by the ventilators at least eight (8) times an hour! And not only this, but there must be a large supplementary change of air by means of opened windows, from time to time.

This requirement will seem startling to those who hear it made for the first time, but it is the acknowledged standard of science at the present day. We should not depend, in this matter, upon statements made by even good authorities, a few years ago; the standard of purity as set by Parkes and De Chamont is the one to follow. There are very few buildings in which it has been attained; but every step taken, ever increasing the purity of the air of a school-room, is followed by a gain in health and comfort, and no one should feel discouraged from attempting improvement, even upon a small scale.

If we wish to ascertain by calculation how much the ventilating arrangements of a given room are actually supplying, we may limit the question at first to the point, how much air is *drawn out* or makes exit in each minute or second of time; since, for each cubic foot of air taken out, another foot must come in. It will be right to ask afterward whence the new supply comes, and what its degree of purity is. But in our climate rooms cannot be ventilated without flues; and if the flues are acting well all the air that leaves the room will leave through them. If the flues are weak and insufficient, it will be hard to make an estimate of the amount of ventilation, but it will usually be small.

CONSTRUCTION OF FLUES.

Few people are aware how small a quantity of air is actually drawn out of apartments by ordinary flues for ventilation. By "ordinary" I mean the old-fashioned sort, of the size of one or two bricks, 4x8 inches or something about that, with a close grating called a register to obstruct the current at the bottom, a sharp angle at the foot, the inside roughened by protruding mortar and with only an accidental opportunity of getting warmed by contact with a smoke-stack. You stand in front of it with a light pocket handkerchief; the cloth is gently drawn toward the opening; it deviates a couple of inches; you say "it draws," and are satisfied. "The thing is working." Probably, in such a case, the rate at which the current moves is something like a foot per second. The flue is drawing out a quarter or a half of a cubic foot of air per second — enough, perhaps, for *one person's* requirements. A large school-room may often be seen provided with half a dozen or more of just such ventilating flues which are considered to be "the correct thing," and are pointed out to the visitor as the evidence of good ventilation in the house. Evidently the question of "How much?" is of leading importance in some other matters than those of finance and trade.

It is strongly to be recommended that school authorities should take steps for ascertaining the real working capacity of the flues in the school-houses, for the degree of deficiency can never be known in any other

way. The anemometer will give a pretty faithful statement of the current actually passing the flues. Analysis for carbonic acid in the air of the room will give an excellent test. Nor ought we to pass without mention the useful but too often uneducated sense of smell; it furnishes data which make the foundation of all our mathematical calculations, and is by itself a faithful guide for a short time.

A ventilating flue must draw, or it is worthless. This quality, which forms its sole merit, is dependent on several points.

1. It should be as straight as possible from beginning to end. Curves and angles are very great obstructions.

2. It should not, as a rule, be horizontal, or descending in any part. There are special exceptions to be noted hereafter.

3. It should be continuous from the beginning to where it discharges out of doors. A flue that ends in an attic has less carrying force than one that goes up through the roof. The air comes up with a rush, and is dispersed in the air of the attic; the rush, the momentum, which it brings with it is lost in the space. True, the air will get out by a ventilator at the ridge-pole, if there is one, but the conditions for successful working are best attained by a continuous column. A tight box lined with tin may properly be used to collect the flues and discharge their collective contents by an opening, as in Fig. 1.

4. It should be smooth internally. A tin pipe is as good as any, and has the advantage of not parting with heat so quickly as dark or slightly roughened metals will. If a brick flue is used it should be larger than the dimensions named above, and should be plastered smooth inside. The hollow spaces in walls should not be relied on to do the work of flues. The width is very small, and the friction against the bricks or lathing is enormous.

5. It should be so protected as to lose no heat. A tin flue passing through a cold entry should be boxed with wood. It should not have a very great distance to traverse in the open air, if of metal. There is, therefore, a certain advantage in compelling tubes to converge inside of the attic, as in Fig. 1, instead of passing up straight through the roof, as in Fig. 2.

6. It should be so protected that the rain will not beat in or the wind blow down. Certain caps will accomplish this object satisfactorily.

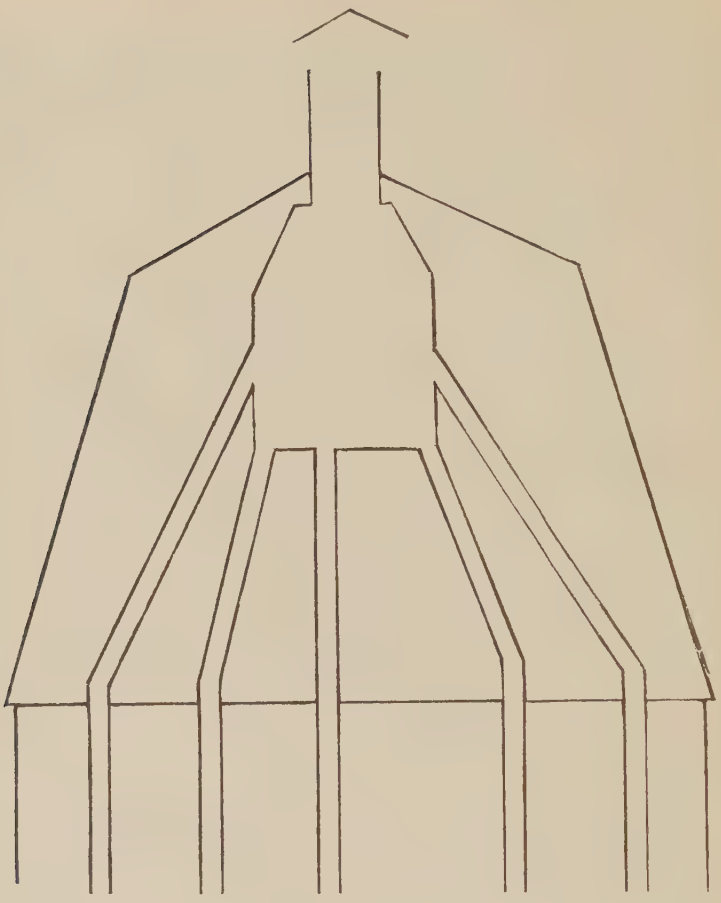

FIG. 1.

There are other caps which increase the upward draught when the wind is blowing upon them, but their action is uncertain, and they may sometimes check the upward current instead of assisting it. The outlet should not be a narrow one, barely equalling the capacity of the flue, and compelling the current to twist and turn in making its exit.

It will be useless to rely upon the "extractive power" which some ventilator caps are said to possess. This power, if it exists, is largely dependent on the force of the wind, and must therefore be reduced to nothing at times.

7. The flue must be devoted to the uses of a single room. If it opens to rooms on successive stories it often serves as a passage from one story to the next above, especially when the flue is not warmed. The heated flue, on the other hand, when drawing from different stories at once, has a much less powerful action upon the upper story.

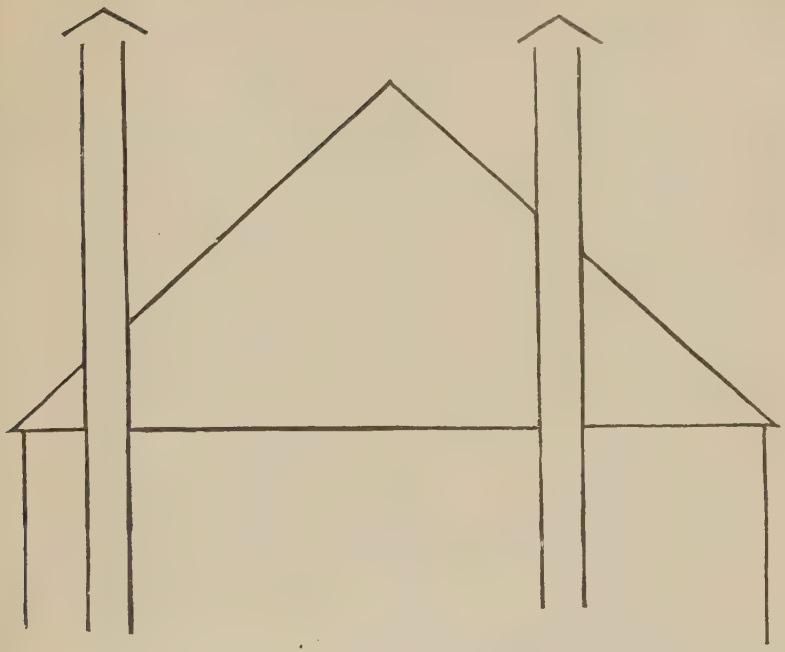

FIG. 2

8. The flue should be warm; at least it must be as warm or warmer than the outer air, or else the current will be inverted.

Flues ought not to be placed in *outer* walls. Much heat is lost and the opportunity for heating by contact with the chimney is sometimes omitted. An air-space is sometimes employed as a defense. When, for instance, a triangular brick flue is placed in the corner of a room (which is a good arrangement for saving space), the wall should be double on the outside.

WARMING OF FLUES.

The subject of applying warmth to flues is a somewhat extensive one, but a few methods ought to be mentioned.

(*a*) A brick triple-shaft with the central flue devoted to the smoke from the furnace and the two side-flues for ventilators.

(*b*) A brick-flue heated by the metal smoke-flue from stove or furnace (twelve-inch cast iron pipe).

(*c*) Flues of any kind containing steam pipes or coils, specially intended for heating the flues. This is a comparatively expensive plan, both in first cost and in running. The steam thus used costs extra, whereas in plans *a*, *b*, and *f*, the heat employed is that which would otherwise be wasted.

(*d*) Steam-coils placed in the chest at ridge-pole (fig. 1). This is not an economical plan to apply heat; it affects only the upper few feet of the column of air. Still, it may be advisable in some cases.

(*e*) Gas-jets burning behind a pane of glass, which is let into a tin pipe. This is efficient, yet inexpensive in construction. The efficiency is increased by Gouge's methods.

(*f*) In a variety of ways the stove or stove pipe can be made useful to expel air from the room. The following paragraphs describe a few such plans:

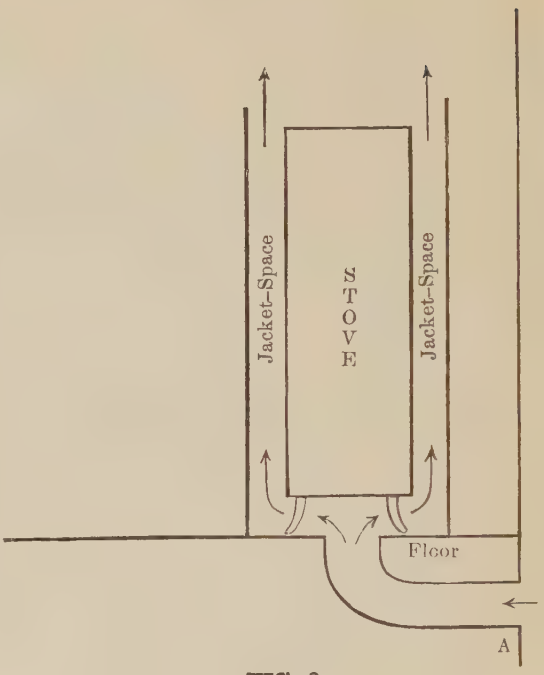

FIG. 3.

STOVE VENTILATION.

The "jacket" or metal screen for a stove, can seldom be dispensed with in a school-room. Its first use is to protect from excessive heat, but it may also be used as an aid to ventilation. Fig. 3 shows how this is done. A metal cylinder, considerably wider than the stove, is placed around the latter, and its edge is fastened to the floor. A good sized pipe is then carried through the floor, under the stove, and led through the house-wall at A. Guard the inlet with a screen of wire at A, and a considerable supply of pure warmed air is drawn into the room. This is one of the cheapest and best devices for warming and ventilating. Some prefer to extend the jacket around only a part of the stove and leave the door uncovered; or the jacket may stop at the bottom of the stove and be made fast to the latter at that point. The arrangement is similar in effect to a "portable furnace," such as is usually placed in a cellar or a basement hall.

In *figure* 4 a stove is represented standing close to an open window. The movable semi-cylinder of metal, commonly used for a screen, has been so placed as to enclose the stove on all sides except that toward the windows. Cold air may then be freely admitted; it is quickly warmed by contact with the stove and is thrown upward with the general current.

Figure 5 shows air brought in so as to be warmed by contact with a

stove pipe. The inlet flue is enlarged and runs up with the stove pipe, like a jacket, for some distance.

Figure 6 shows how a stove pipe may assist in removing injurious air. The diagram represents a two-story house with a chimney which comes down to only a very short distance from the roof. The opening into the chimney for the stove pipe is enlarged so as to receive a much larger pipe, which encircles the stove pipe like a jacket. This jacket may stop short at A, or may be carried through the floor to B in the first story. It will secure a draught from either story as may be arranged. The idea of this and the preceding figure is borrowed from an article in the report of the Michigan Board of Health for 1879.

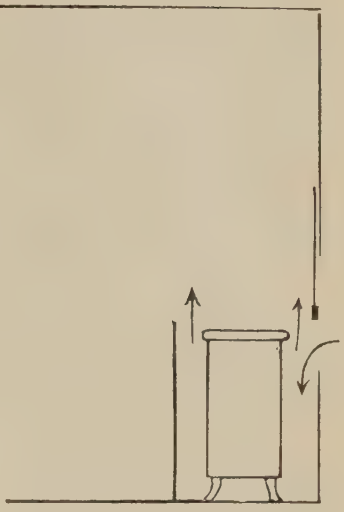

FIG. 4.

A chimney into which a smoke-flue discharges may be opened at any point *below*, and not too near, the point where the smoke enters. Many rooms, for instance, have chimneys which reach to the floor, while the stove pipe enters near the ceiling; such chimneys ought to lend their powers to the task of ventilating the room by an opening near the floor. The latter ought to be closed when the fire is making.

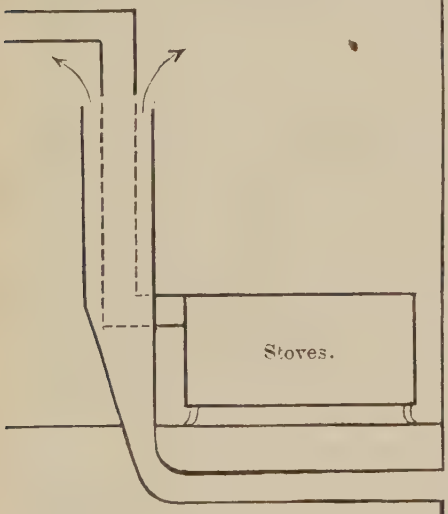

FIG. 5.

The term "aspiration" is applied to the suctional force of heated flues. In large buildings a single shaft is often planned so as to do the whole work; in this case, the room-flues sometimes run in the floors directly to the shaft, while in other buildings all the flues are made to descend to the base of the shaft before entering it. A discussion of this matter on a large scale is beyond the purpose of this paper. Where the number of rooms is great and the exposure to the weather is different in different parts of the building, unequal action is likely to occur.

If the shaft or flue opens into the upper part of a school-room, the air drawn out is several degrees hotter than if it opens near the floor. The draught is therefore more powerful. Still, it is best to draw the air from a point near the floor, the effect of which is to stimulate the circulation of the warm air of the room in a downward direction, thus equalizing the temperature and increasing the value of the heat given out by the stove. No draught will usually be felt from it by a person sitting at the distance of four or five feet. We need not be influenced by any theoretical considerations as to the level where carbonic acfd is most abundant — there is no great and constant difference between different levels; but we shall not fail to find sources of impurity of air more frequent at or near the floor than higher up. If gas is burning, the case is different.

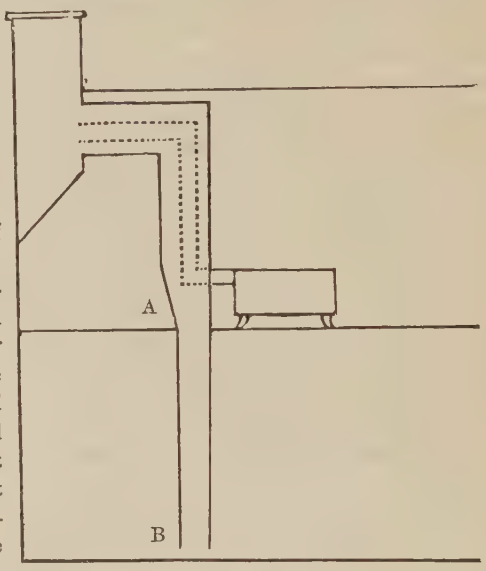

FIG. 6.

As regards a heating apparatus, furnaces in cellars are most manageable when standing directly under the rooms they are to heat, or at the windward corner of the house; in other cases they sometimes play strange tricks, refusing to yield warm air, or drawing it out from the room. A steam apparatus has this advantage, that the heat can be placed just where it is needed. Whenever a supply is wanted in a room, a tin pipe (wood should be avoided as unsafe), can be led down from that point to the cellar, and a steam coil put there, encased in a wooden box lined with tin to save heat, which has a value for stormy weather; but in no case should air be taken from cellars for school consumption — certainly not while the school is in session.

SOURCES OF FRESH AIR.

There is much carelessness about the source of air which is drawn into furnaces for heating, and sent up into rooms. The ground may, it is true, be a pure and inoffensive bit of turf, but that is an unusual condition in a city school yard. Bad air, malarial air, is known to settle upon the ground in many cases. The ground-level is less reached by the renovating breezes than higher levels. Sundry unpleasant surroundings of school-houses are at the ground-level. As a rule, openings for drawing the outer air into the heaters had better be at points above the children's heads, and covered with wire netting.

Something more should be said of the cellar. It cannot be too often repeated, that the purity of cellar air lies at the foundation of the purity of house air. The danger of severe and sudden illness lurks in cellars, as often as in sewers. The common practice in regard to cellars is to bury the drain under its floor — to place water-closets in its darkest corners — to store combustible rubbish in wooden bins (I have seen great heaps of paper scraps) — to pile away old rotten boards and clothes — to hang children's outer garments in it — in short, there are few uses of a menial sort to which it is not put. The cellar is often without a proper floor, often is very dark and close for want of windows, often is darkened by placing the heater-boxes in front of windows.

To these sources of pollution (for darkness is one source) add the fact that in cold weather a powerful outside pressure exists, forcing air into the cellar, and thence into upper parts of the house. It is too much to expect that an average cellar will be so pure, so free from all these objectionable things, that air may safely be taken up from it by furnaces for the consumption of the house.

Let the floor be concreted or asphalted so as to be air and water-tight. Put no drain underneath, unless in trench with a wooden or stone cover. Put *one* large trap outside of the walls for each sewer, ventilate it by an opening just inside the trap, run the soil-pipe up full sized several feet above the roof, and protect it from rain; ventilate the trap under each washstand. Have no water-closets in the cellar; or if they be thought necessary, isolate them in separate chambers of masonry with abundance of light, accessible to the children from the outside only of the house. Give a plenty of windows and good height, and keep the walls whitewashed.

Indirect Radiation.

Heating "by direct radiation" means the use of steam coils placed *in the rooms* to be warmed; it economizes heat but does not assist ventilation. There are some devices for introducing fresh air so that it shall pass over such coils; holes in the wall of the room with valves, etc., but they are ineffective for the most part. The coils should be *in the basement* enclosed in separate boxes, and with separate, abundant air supplies. Such boxes may be made of wood lined with tin, to save waste of heat. They will naturally have a door in the side for inspection of the interior, but that door ought to be kept closed and locked; no *cellar air* should be allowed to enter the receptacle of pure, warmed air for the supply of a school-room.

If a coil were substituted for the stove in figure 3 it would make a good apparatus.

The objection to "direct" heating is the deficiency in the supply of fresh air. The same objection holds good in the case of "hot-air furnaces," if they are driven excessively and deliver a small quantity of overheated air. The latter condition should be rectified by making the furnace and its channels of inlet and delivery *large enough* to give an abundant supply of *warm*, not *hot*, air.

It must be constantly borne in mind, that the scholars are not to be exposed to draughts of cold air when it is possible to avoid them. In every way, we should try to warm the air, even a little, before it enters. The methods shown in figures 3 and 4 illustrate this, but are not in themselves adequate to give a *full* supply of air.

If a room has a strong exit-draught, it is evident that much air must also enter it. It is possible that a school-house may be so built that the former point is attended to, and the latter neglected; there is a good ventilator, but no supply of fresh warmed air. In such a case, it may happen that the school-room will suck in its supply from the adjoining cloak-rooms, halls, passages, water-closets, and even the cellars, with unpleasant results. It is not proper to seek to supply the defect by keeping windows constantly open — or by open transom-sashes; windows cause draughts, and ought not to form an element in our calculation, if we are planning a system of circulation of fresh air. Fresh *warmed* air is wanted.

A point against the direct method of radiation is the difficulty of governing the amount of heat in mild weather. This should be considered, however, as a defect of arrangement. Coils should be in duplex or triplex systems, and it should be easy to shut off steam from one half or two-thirds of the pipes.

AUXILIARY MEANS FOR VENTILATION.

No system of flues, however skillfully and liberally planned, is likely to take the place of windows altogether. This paper has already made the assumption that school-houses require but half the amount of fresh air which is required for permanently occupied houses. What justifies the assumption? and what conditions must be looked to in order to supplement the assumed deficiency? "Thirty cubic feet of fresh air per minute and head" will not keep a closed room fresh for two or three hours of uninterrupted school-work.

There are certain auxiliaries to ventilation that are in the power of the teacher; and there is also something in the original plan of the building which contributes to a free movement of air, or impedes it. We will, therefore, speak of. 1. Airing-out; 2. cleanliness; and 3. floor-plans.

1. Troops on the march are accustomed to halt ten minutes at the end of each hour. A school should also have its halting times (and once in an hour is not too often), when the air may be renewed by a quick and brief opening of the windows, while the pupils go through some light gymnastics. A principal use of the fifteen minutes' recess is to effect this more thoroughly. A complete renewal should be accomplished after each session, and no room allowed to be closed after sweeping until the dust has wholly subsided as far as the sense of smell can judge.

It is no wonder that teachers are glad to get rid of the old-fashioned school recess. Houses are now placed in the midst of thickly-settled towns, where the children, if they are allowed to run in the streets, are in personal danger, and if kept in the yards have hardly elbow-room.

Their shouts annoy the neighbors — though shouting is really one of the best parts of their play. Some teacher has to watch them while in the yard; and this must be, especially for ladies, one of the most difficult and distasteful parts of the teacher's duty. If the rooms are aired out at recess, some of the delicate or lazy, or over-studious, will object to the draught. I know a school where there is but one yard for boys and girls; they have, therefore, a recess at different times for the two sexes, and one-half of the scholars are always left in the rooms, so that no airing out is possible. Still, the uses of recess remain. To provide for the delicate children, or for the case of bad weather, a play-room, warm, airy and light, ought to be provided.

No apparatus that can be named will do so much good at a very small cost as the window-board. By that term I mean a plain piece of board, as long as the window is wide, and from four to eight inches wide. The lower sash is raised, the wood is inserted, and the sash is shut down upon it. The air enters in a thin stratum passing upward between the upper and the lower sash, in a nearly perpendicular direction, without causing perceptible draught.

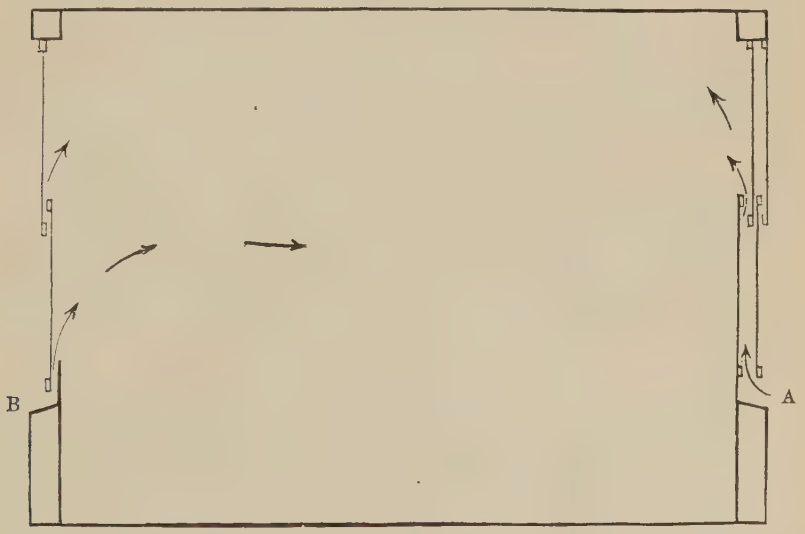

FIG. 7.

The diagram (fig. 7) represents a window provided with the board, and air entering at A. The window is, however, represented as double; this gives great protection from the cold, and also enables the air to enter the room slightly warmed by contact with the lower pane. All four sashes of double windows should be movable.

In many places, teachers have told me that they have found these simple methods of much service. But it must be borne in mind that they may give rise to draughts, which are unpleasant or even injurious to certain scholars. Some are more sensitive than others, and some are subject

to chronic catarrhs of the throat or ear-passages, which are very easily aggravated by draughts.

The window-board is sometimes pierced with holes for tin pipes, which are bent upward at right angles. This effects the above-named results at a greater cost.

A kind of mosquito-bar, covered with thin flannel, may be used to sift dust from the air. But dust-sifters are air-stoppers. Such apparatus is not adapted to the case of rooms with many occupants.

CLEANLINESS.

2. There is an invisible something which clings to the substance of wood and plaster, and continues to give out a smell after the air has been renewed. This sort of emanation cannot be conducive to health. It brings startling suggestions of "hospitalism," or hospital smells and infections. Whoever will aid in banishing this smell from schools is a benefactor. Strict cleanliness is the remedy, associated with good ventilation.

It is not superfluous to say that once or twice a year is not often enough to wash the school-room floors! Schools do exist in which the washing is done weekly on Saturday morning, the sweeping daily after sessions, and dusting daily in the morning, everything being finished half an hour before school opens.

A floor might be non-absorbent. Seasoned yellow pine and maple are both good materials; they can (especially maple) be so prepared by oiling as not to need washing, but only the use of a damp cloth.

Dust comes from the mud brought in upon the children's shoes. There ought to be no muddy school yards. The use of mats and scrapers must be provided for and enforced.

Children of the poorer classes come to school with their clothes smelling of the day's cooking, and much else. Teachers and charitable visitors can do much to encourage or compel children to come with clean and decent garments, and clean face, hands and hair.

CLOSETS FOR CLOTHES.

It is not proper to hang overclothes in the rooms where scholars sit. A closed wardrobe or closet in the school-room condenses the effluvia, and concentrates the effect of packing a quantity of moist, reeking rags. The chance of diffusing infection is increased by such contact. A closet should be large enough for each child's clothes to hang without overlapping another's. It should have good light, and free circulation of air, and be well warmed. If the corridors are wide, warmed, airy and light, a portion may be set off by a board partition for the use of each class, the boards to reach six feet in height, and to come within six inches of the floor. If clothes are hung in the basement, care should be taken that the furnace does not send the air of the clothes-room up-stairs.

Walls that can be washed are a desideratum; paint answers the purpose well. Wall paper is so pretty that it is a pity to condemn it; but it is very absorbent, and not allowable under strict sanitary rules where large numbers are congregated.

PLANS OF BUILDING IN REFERENCE TO VENTILATION.

3. In planning a house, it is well to place the windows and doors so that those slight currents which enter by cracks or by partial openings may traverse all parts of the room. We thus call to our aid a correct principle of "natural" ventilation which should not be lost from sight even when we think our artificial methods are perfect. Let each room be adapted to the rapid renewal of its air by swift currents which reach every corner as soon as windows and doors are flung open; and let this kind of airing occur more than once in each day's work, and once after each day. Such a room is seen in Fig. 9. A room planned as in Fig. 10 will be likely to have less perfect ventilation. And fig. 11 shows a still more decided error. (Compare rooms E and F in Fig. 13, which are well ventilated.)

FIG. 8. A room well-shaped for imperceptible ventilation, or for quick change of air when desired. Two doors, four windows. Pupils face in the direction of the arrow.

FIG. 9. Ventilation more liable to be imperfect. One stagnant corner at W.

A corridor or hall may be regarded as a supplementary aid to ventilation. It ought to have sufficient means of heating, and here, if anywhere, is the place where direct radiation is suitable. It should run straight through the house and have practicable windows at both ends which should be open except in the severest weather. Not being occupied by scholars the air will be easily kept pure under these circumstances. The use of transoms over doors is to draw upon this supply of pure air.

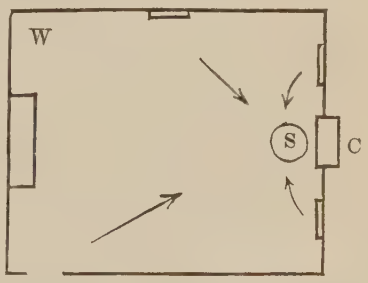

FIG. 10. The chimney, C, draws air from the room by two ventilating holes. The stove acts in like manner. Air entering by small cracks at a door and three windows, taking the direction shown by arrows, leaves the corner W. unventilated. Taken from a school in Rochester.

The school-house should be so cut up by corridors that every room should have a corridor running along at least one side. A house thus cut up is analogous to a city with broad streets; the air circulates more quickly and in larger masses.

The heaping or packing together of rooms is a distinct impediment to ventilation. The air which passes into a room through unperceived channels may be estimated as sufficient to change the contents of the

room once in an hour. Now, every room has four sides, a top and a bottom. Examine the condition of a room thus packed — say one of the middle rooms in Fig. 12. It has a cellar below, rooms on three sides and above; hence its unperceived renovation of air must come very largely from impure sources. Wind blowing from A will force air into B; wind blowing from C will force the air of the front room through the middle and rear rooms. The very multiplication of partitions, however, is itself a check to currents of air.

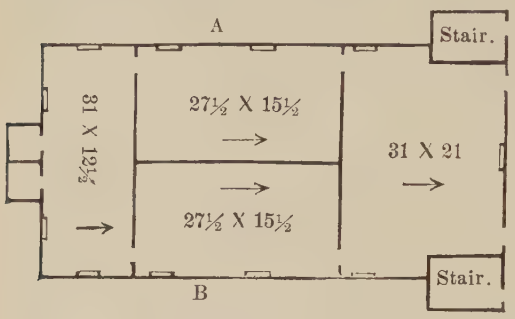

FIG. 11. Seventh Ward School, Troy. Unsurpassed for compactness; glass partitions; pupils face the light.

Figure 12 shows a good use of corridors. Better still, if rooms A, B, C, D, had been placed lengthwise along the corridor, instead of endwise.

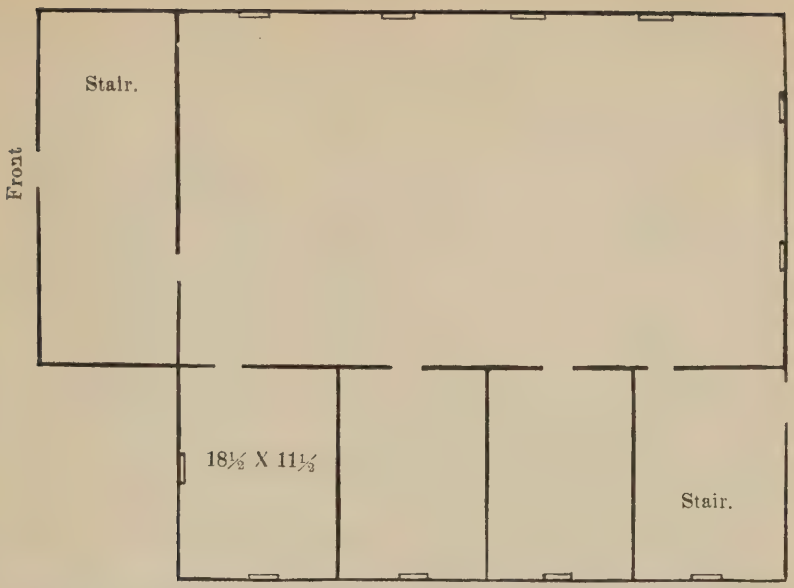

FIG. 15. Court Street School, Utica. Compact arrangement, four rooms contiguous. Could easily be enlarged so as to give four rooms, forty scholars to each room, with corridor in middle. Arrangement bad for airing small rooms.

FIG. 16. Francis Street School, Utica. Light insufficient in large room. Compact arrangement interfering with lighting and airing. Very badly planned for natural ventilation.

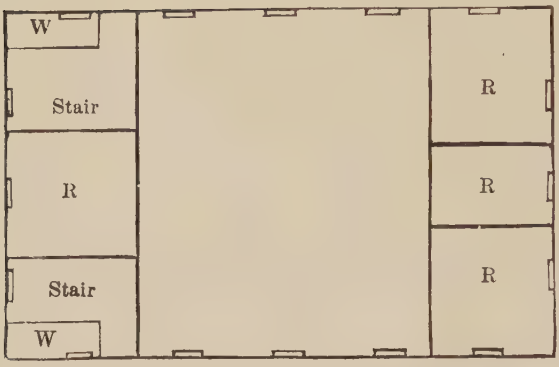

FIG. 13. Thirteenth Ward School, Troy, old pattern; recitation room system.

The analysis of plans of schoolhouses leads us to form a distinct class or group of those which have recitation rooms as an adjunct to one large common study room. This, the recitation room plan, as it may be called, is exemplified in Fig. 13. It has the faults of the compact plan, with very little modification. In a house of this sort one looks into the small rooms at once for instances of bad air and crowding. It is not sufficiently remembered by school builders that the class requires pure air when reciting as well as at other times. One-half of the scholars are sent into the small rooms, which in aggregate space may equal one-third of the room they leave. Those left behind enjoy tolerable air; while commonly those reciting are intolerably confined and cooped up, without a chance for relief (for draughts at close quarters are dangerous) until the hour is over. The example following (Fig. 14) shows an improvement in two respects, as indicated in the note to the cut; it is evidently based on the previous model, while the two following show a like affinity for each other (Figs. 15, 16). The objections on the ground of light will be named on a later page.

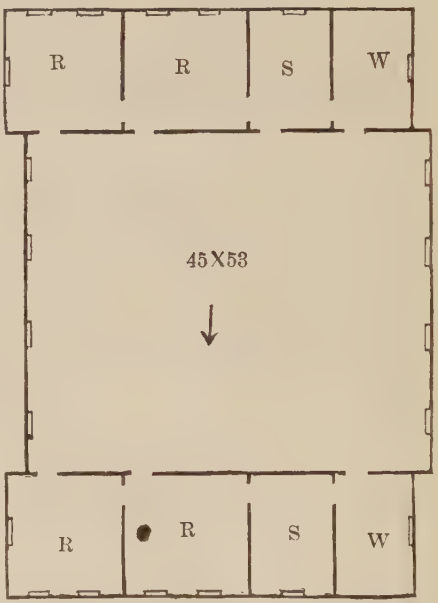

FIG. 14. Sixth Ward School, Troy, built four years ago. (R, recitation rooms, about 16 feet square; S, stairs; W, wardrobes.) This figure shows the recitation room system; size of R still too small for the number that occupy them; breadth of large room between windows more than is desirable. The improvement, as compared with Fig. 14, consists in the placing of stairs at both ends.

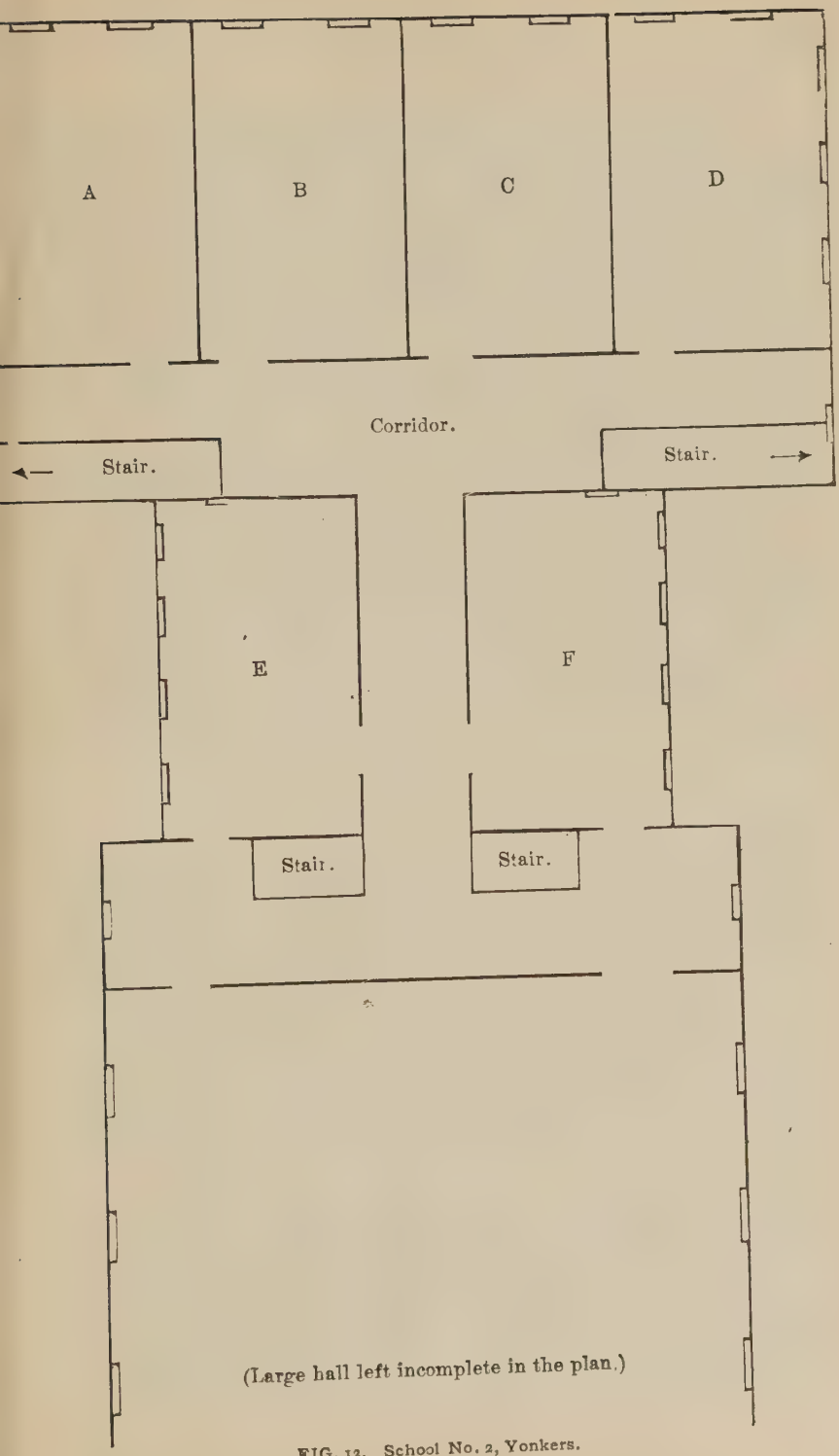

FIG. 12. School No. 2, Yonkers.

TEMPERATURE.

Poor ventilation is so often connected with overheating that the latter must be ranked with it as a cause of ill health. Hot rooms are a common cause of "taking cold." They give a headache to some. They sometimes aid in keeping up a forced activity of the circulation of the brain and nervous centers, causing nervous irritability and sleeplessness. Weak sight, especially near-sight, is greatly aided in its development by hot rooms and bad air. The heat acts at once in flushing the face and producing congestion of the eyes. It acts indirectly and chronically by producing a slow debilitation of the system and impoverishment of the blood. Such a condition is most favorable to the production of weak or short-sight. Bad air, poor food, late hours, overwork, dissipation, anxiety, are causes which work toward the same result.

What is "overheating?" It is a little difficult to reply. However, it is certain that there are teachers who succeed in keeping themselves and their classes comfortable and cheerful at temperatures ranging from 60° to 65° Fahr. I have seen a boy of ten years sitting in shirt sleeves, having taken his jacket off because he was too warm; the thermometer stood at 62° on the desk beside him, and the other pupils were comfortable also. It is clear to me that the range from "68° to 74°" is decidedly too high for a standard. Some teachers may require this degree of warmth, especially if suffering from colds; but a lower range, even one which has 68° or 70° for its highest point, seems desirable for schools. It is, moreover, a fact that we are comfortable at a lower temperature in pure air than in impure.

LIGHTING AND EYE-SIGHT.

The influence of school life in promoting the increase of near-sight is by this time one of those commonplaces of which the reader cannot be supposed to be ignorant. Germany, Russia, Switzerland and France have all contributed statistics, showing that the affection is a universal epidemic, localized wherever severe duty is pursued, attacking all grades except the very youngest, and increasing in regular progression from the commencement to the end of study. At the moment of writing, a paragraph is going the rounds of the newspapers, giving the statistics of the six hundred pupils in the High School of Chemnitz, Saxony, in which in eight classes, beginning with the lowest, the proportion of near-sighted is respectively 10, 17, 20, 25, 35, 44, 44, 64 in 100. This one series is a fair representative of a score all made with great care and exhibiting the same result.

The case is different in America, but only in degree. Children study a good deal less, their school accommodations (in cities at least) are better, and their mode of life in some respects is better, than in Germany. But there is a considerable amount of near-sight in this country. Three hundred and twenty-one students were examined by Dr. Derby on entering Amherst College, and 35.9 per cent were found short-sighted. One class entered with 44 per cent and graduated with 50 per cent. In brief, although

we have less absolute near-sight, still that which we have is of the same nature and tendency; it is engendered by study, and is increased by continued study as rapidly as in Germany.

The percentages of near-sight in 2,500 public school children, examined by Drs. E. C. Loring and R. H. Derby, in New York city, were 3.5 for the youngest classes and 26.78 for the oldest. The poverty of blood and weakness of fibre which are produced by bad ventilation and over-heating contribute to the causes of near-sight in no inconsiderable degree. The point of most immediate interest, however, is the amount and distribution of light in school-rooms.

Certain fashions in architecture interfere with the requirements of airing and lighting. Pointed windows, heavy mullions, buttresses and cornices, may do so. In all styles, except that based upon practical usefulness, the size of and position of windows are subordinated to architectural effect. Small sized windows are employed to produce an effect in the façade, in that domestic classic style which was so much in vogue in the early part of this century, and which has left traces upon our school architecture. A frieze, in a classically proportioned house, occupies a band of several feet in width below the eaves, which must be kept sacred from such vulgar uses as that of windows. The frieze may not be actually there, but a place is left for it, a blank ribbon of wood or stone above the brick wall and the window-heads. Classic usage requires a strict subordination of windows, one might almost say, a suppression.

In certain places there prevails the singular custom of making the upper story much higher than the lower. For example, in Rochester, School No. 19, the distance from the top of the glass to the ceiling is 28 inches in the first story and 78 inches in the second. The High School at Binghamton has four stories, the height of which, beginning at the bottom, is respectively 14, 15, 16, 17 feet. This practice is related to the custom of using the upper story for a large hall or assembly, but it has been retained (from habit?) in cases where there is no such hall. It has the advantage of airiness, but the architects have not seized the full advantage of the arrangement by carrying the windows up near the ceiling. A certain loss of light results, which is seriously felt in certain cases, as in that of the High School at Rome in Oneida county (a classic structure).

Glass sliding-doors are still in frequent use in some places, but I am inclined to think that they are going out of fashion. It is doubtless supposed that they give aid in lighting the rooms; but this is very questionable.

During the inspection of school-buildings, conducted under the orders of the Committee on Public Institutions, in 1881, many buildings containing glass sliding-doors were seen, and compared with those of similar plans which have no such partitions. As a result, it has seemed desirable, not merely to express disapproval of the glass partition plan, but to give some illustrations, and explain the reasons.

From a theoretical point of view, we must consider:

1. That the glass in the partition reflects a part of the light and throws it back out of the window.

2. That it absorbs a part.

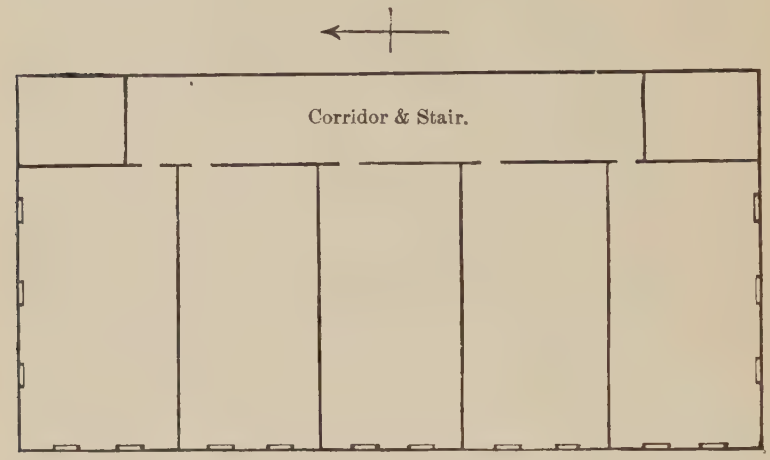

FIG. 17. School No. 13, Rochester, Second floor. Division into five equal rooms by glass partitions. Very poor light and diminished ventilation in three interior rooms.

3. That it allows a part to pass straight through and out by the windows of the opposite side of the room or house. To this add the fact, that in examining the plans of houses where glass partitions are used, we find that there is not generally light enough to supply each separate room supposing the partitions to be solid walls; from which we are entitled to infer that the planners thought that the supply was increased by using glazed partitions. Figure 17 will illustrate this. No one could suppose that the architect intended to illuminate those long slips of rooms by two moderate-sized windows at one end; but in reality the light does come almost wholly from that quarter in all the inner rooms.

4. In brief, the total amount of light available in the case of glass partitions is no greater than in that of white solid partitions. The white wall does not waste any more light than glass does. The light that goes through glass to an inner room is light that is needed in the outer room.

Figure 18 shows a more recent plan, which looks attractive. The middle room of three receives light from the rear and two sides. Why does it not receive enough? The answer is a two-fold one: First, because so much side-light is cut off, and second, because the side-light is so distant and slanting.

1. To a person standing in A (see fig. 20) the objects in B seem less distinct than those in A. A part of the light is thrown back from the glass into A, as we may see by the reflections on the sash. The ceiling and floor of B are darkened by the wooden frame work, and the grooved beams in which the doorheads slide. A person at B. notices an increase in the light when the sash is opened.

2. A side-light from the window at A cannot be expected to be of much use beyond the width of A. It strikes B too obliquely. The simple rule, of allowance for depth is that no window shall be required to throw light to a horizontal distance greater than once and a half its height, supposing its head to be quite near the ceiling. The diagram represents a row of rooms, each twenty-four feet wide and fourteen feet high. The window head is three feet from the ceiling, and eleven feet from the floor (as is very often the case); the light may be sufficient as far as the mark S on the floor. If the house stands on a large lot with a wide, open outlook, the inner seats, in A, will be well lighted; but in an average street, with houses of moderate size opposite, they will be poorly lighted. A portion of the light in B will be very poor, indeed. Finally, the light that goes through from A to B is chiefly lost to A; if a smooth white wall were put instead of the glass sliders, the wall would throw the light

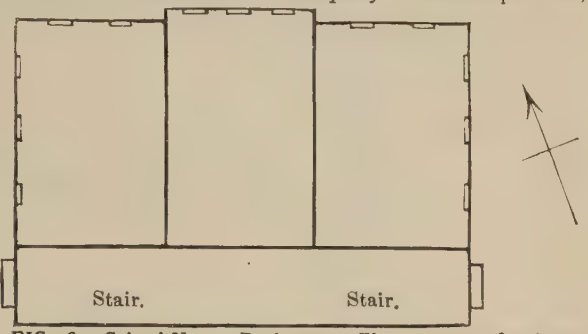

FIG. 18. School No. 24, Rochester. Three rooms 32 feet long, with glass partitions.

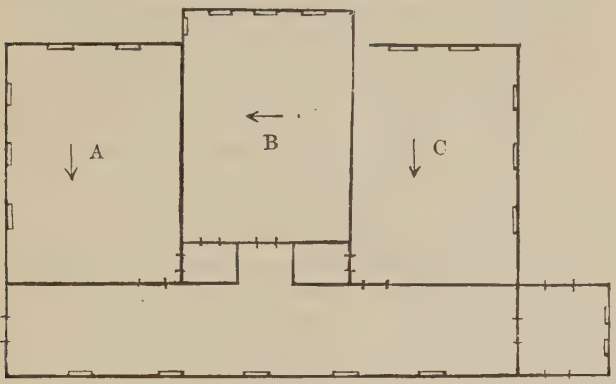

FIG. 19. School No. 26, Rochester; built 1879; first floor. Here there is an evident attempt to remedy a defect in such a plan as that of Fig. 18. The middle room is of the same size as the others, but has five windows all at one end; a great gain as compared with No. 19. The inferiority of B to A and C is still evident, however.

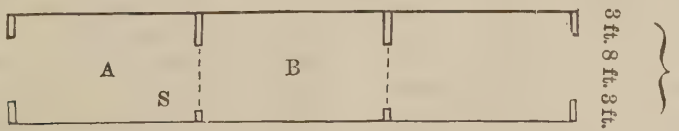

FIG. 20. Diagram of three rooms in Fig. 19, in perpendicular section; open spaces at right and left represent windows; dotted lines represent glass between rooms.

back upon the desks in A. This part of the light is really needed, and it is most needed just where it comes, at the back of the room

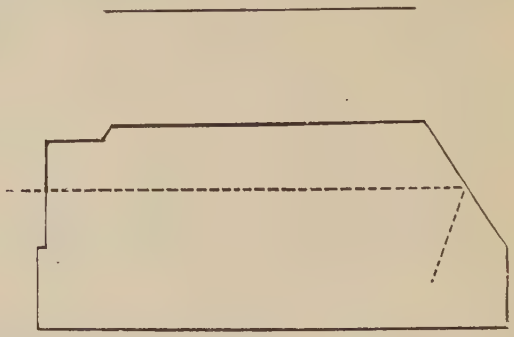

FIG. 21. Cross section of room with sloped inner wall, with a ray of light reflected from wall.

A good deal is gained by slanting the inner wall (where that is feasible) so as to throw the light more directly downward, as in figure 21 The writer has knowledge of one room in the Albany High School which is a favorite with the pupils for this reason. But even an upright wall is of much value as a light giving surface. The ceiling is of great importance in this respect, and must not be cut up by cross-beams; it should be white, while the walls are tinted very slightly in some neutral color.

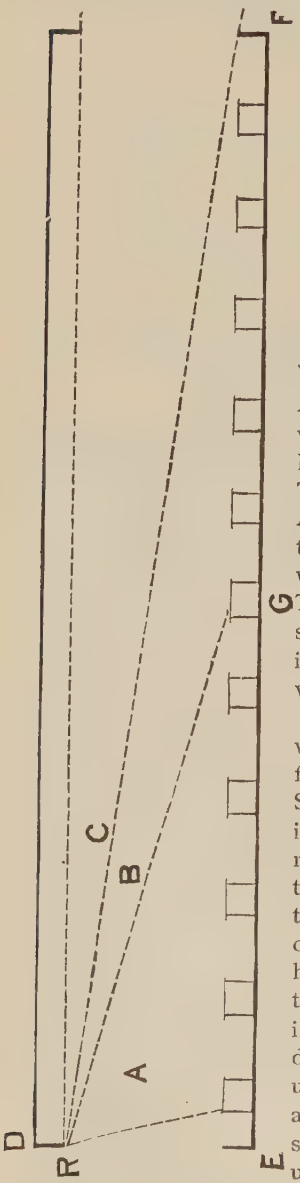

FIG. 22. Perpendicular section of Syracuse High School, from side to side.

If the three rooms represented in figure 20 were thrown into one, the result would be like figure 22, which represents one room in the Syracuse High School, seventy-four (74) feet in width (E F), and fourteen feet high (D E). A ray of light is supposed to enter at the top of the left-hand window (R), and to divide into three parts. The first part (A) is ten-twelfths of the whole, and falls on the desks in the left-hand half of the room. One-twelfth (B) passes to the desks in the other half, and the remaining twelfth (C) goes out at the opposite window. The object of the figure is to show how unimportant a fraction of the whole light from any given window reaches the distant parts of such wide room. If a glass partition were set up at G, the amount passing through could not be more than one-sixth of that which is diffused in the left-hand room, even leaving out of the account the obstruction caused by the frames and the glass itself.

By carrying out the idea further, we may enlarge the desk at G, and may represent in figure 23 the extreme slant at which rays of light will strike the desk, so that a small object casts a shadow over the whole lid. In figure 23, however, the light is represented as coming from the direction of the middle of the window, in order to get an average result. In a room thirty-six feet wide, the inside row of desks is in such a position.

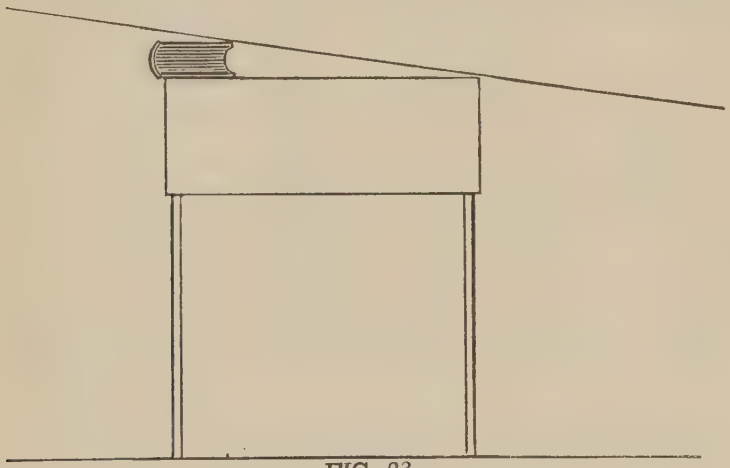

FIG. 23.

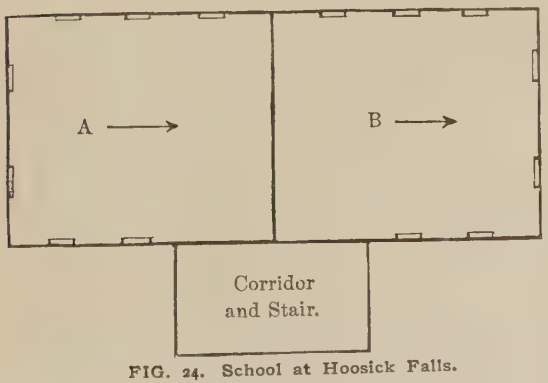

FIG. 24. School at Hoosick Falls.

The most valuable light is that coming from the center and upper part of the room or window. The more perpendicularly it strikes, the better. Therefore, the window-heads ought to be as near the ceiling as possible; that is within six inches or thereabouts.

A few more illustrations of imperfect lighting may profitably be added. Fig. 24 represents a school at Hoosick Falls. The two rooms, which constitute one floor, are each thirty-five by thirty feet in size. A sliding glass partition throws both into one, for the purposes of exercise in common. This presupposes that the scholars face the same way in both rooms. The windows at F F are necessarily closed, and the light in B becomes insufficient, the combined area of the glass equaling one-fourteenth of the floor space. Other instances of facing the light for a simi-

lar reason are shown in figs. 25, 29-32, and others, where, as usual, the arrows show the direction of the facing.

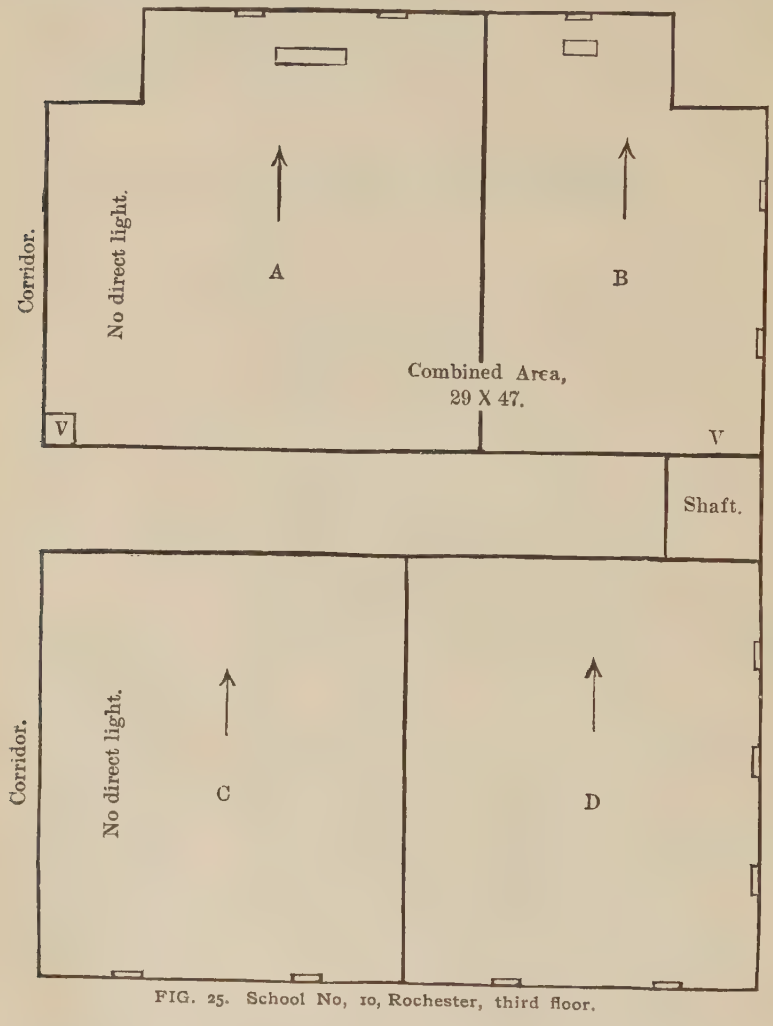

FIG. 25. School No, 10, Rochester, third floor.

Fig. 26, represents four rooms in the upper story of school No. 10, Rochester. The corridor occupies the left hand, but is not given in the drawing. The four rooms are entered by an alley between glass sash-work. The partitions between A and B, C and D, are of glass. A and C are poorly lighted; A especially so, since all the light, with the exception of a little from the windows in B, comes from directly in front. There are, of course, windows on the outer corridor wall; they may be said to be thrown away for the purpose of lighting the rooms, and the same criticism applies to figures 17, 18, 19.

The arrangement is an extremely bad one. Even the shaft (for ventilation) is so situated as to take the place of one window, and the towers (indicated by indentations at the corners) take the place of at least one window each.

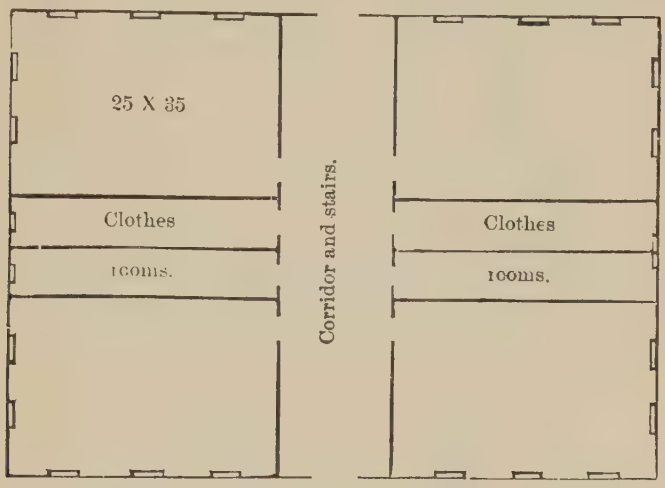

FIG. 26. Type of a school-house with none but corner rooms.

It is easy to see how this plan might have been changed. The house is nearly square, and the dimensions would easily admit of four oblong rooms on a floor, with the entry or hall running straight through between. Upon this plan are built schools No. 15, Rochester, and 21, Albany, both at present fairly well ventilated, owing in large measure to the arrangement which gives thorough ventilation of the halls, assigns to each room two exposed surfaces, and does not allow any two class-rooms to come in contact. The scheme is illustrated in Fig. 26.

The difficulty in the case of corner rooms is, that either the scholars or the teacher must face the light. To many teachers this is a serious evil. Injury may easily be inflicted on the eye-sight. If the teacher is much employed in work with the blackboard, and the maps, and reading-charts, and is more on her feet than in the chair, the difficulty may be overlooked. But if obliged to sit while conducting lessons or overseeing study, she should be protected by a screen. Such a screen is in actual use, and is much prized in all the rooms of the Albany High School. There are two patterns, one wholly of wood, the other a wooden frame covered with cloth and sliding on an iron bar with a heavy foot. (Figs. 27, 28.) They are placed on the desk in front of teacher. The ideal school-room is one with only one exposed side, whereby the most uniform illumination is secured. (Fig. 8.)

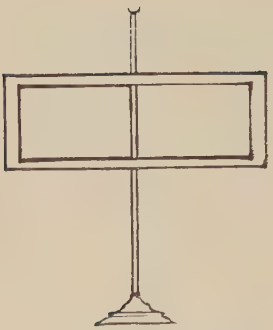

FIG. 27.

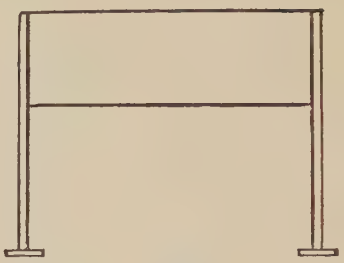

FIG. 28.

Country schools are apt to be incorrectly lighted. But few are so badly off as this octagon (fig. 29), where each scholar faces three windows and stove, or the oblong (fig. 30), where the case is nearly similar.

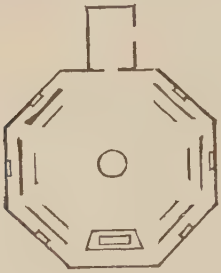

FIG. 29.

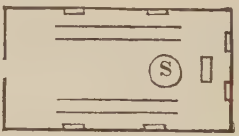

FIG. 30.

The principle that scholars should never face a light when at work is violated in the case of a long room (fig. 31) in the Union school at Schenectady. Here are seated one hundred and fifty scholars of nearly adult size, all facing in one direction. Those who occupy the forward part of the room are under great disadvantages, as the light which comes from the rear is distant, and that in front is near. The room measures sixty-seven feet by twenty-seven feet. The building was originally a college.

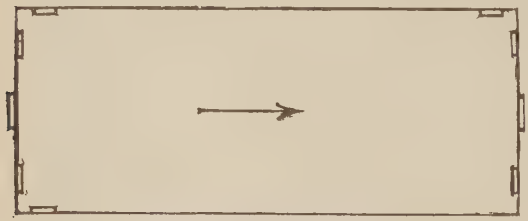

FIG. 31. Schenectady Union School.

In the newest school in Schenectady the scholars turn their backs upon a blank wall and face windows. (Fig. 32.)

From Brockport State Normal School are selected two cases of bad lighting, which is dependent on the great width of the structure. It

would be hard to re-arrange the inner partitions so as to give good lighting. Fig. 33 is a room used for class work, 56 by 34 feet, having all five windows at one end. Fig. 34 gives a room *devoted to drawing*, with the windows similarly placed; it is 34 feet square. And as an instance where the occupants consider the light superfluously abundant, Fig. 35 is a recitation room in the third story, 32 by 18 feet, with five windows, having a glass area = 1-5.3 of the floor area, with a free sky in front. The area of glass in Fig. 33 is 1-16, and that in Fig. 34, 1-9.6 of the floor area. These instances are

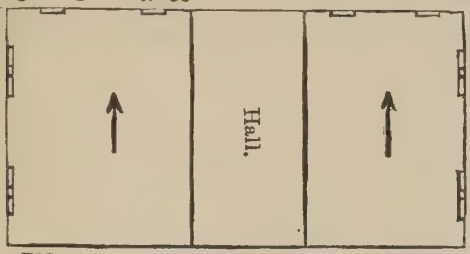

FIG. 32. Schenectady, Park Place. Facing light needlessly.

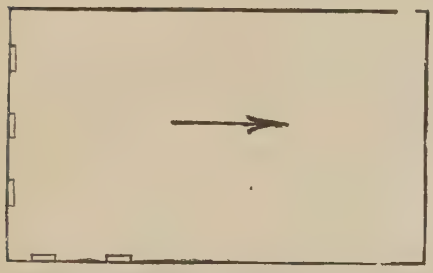

FIG. 33. (Defective lighting.) Room 56x34 with 5 windows at one end. Brockport Normal School. Windows badly placed and insufficient (glass area = 1-16 of floor area).

FIG. 34. (Defective lighting.) Room 34 feet square, with 5 windows. Badly placed, insufficient. Brockport Normal School. Used for drawing and writing. (Glass area = 1-9.6 of floor area.)

confirmatory in a general way of the principle that glass surface should equal from 1-5 to 1-6 of the floor surface in all but exceptionally open places.

FIG. 35. (Light superabundant.) Room 32x18, windows advantageously placed, glass area = 1-5.3 of floor area, and the room looks fully upon the sky.

Fig. 36 is a room 50 by 35 feet, lighted on three sides. The large platform is placed opposite the door, hence the scholars must face four windows. For the case of this badly arranged room the remedy is simply to reverse the position of the pupils. This would, however, give discomfort to a teacher unless a screen were used.

Fig. 37 is an old building. The lighting of the main room is excessively bad. Nearly one half (the rear 18 feet), has no windows, and the scholars face three windows. It is not feasible to reverse the seats for that would bring the teacher's desk to D, which is quite in the dark and faces three windows. The upper story is curiously divided (fig. 38), with one room of very singular proportions: 8 x 23 feet.

Fig. 39 is a one-story brick school at Brockport. With only three rooms, there are provided three entrances (R, T, W are the vestibules). Room C is badly lighted. Lighting has been sacrificed to the symmetry of the plan. The south side of room C ought to have those windows which could have been accomplished by moving R, S, T, to the left, and making T smaller. Room A has one superfluous window on the right, which embarrasses the occupants.

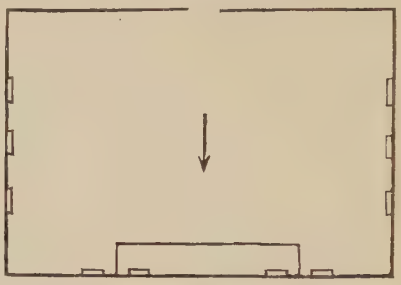

FIG. 36. (Defective lighting.) Room 50 x35'. Scholars face four windows, which have to be darkened. The width of 15 feet in middle of room is imperfectly lighted by side windows. (Rochester, No. 2.)

The corridor ought not to occupy the side of a house, unless that side is known to be undesirable for furnishing light. Exceptions may be made under fit circumstances. But when a house is placed on a narrow lot, under circumstances which make it even possible that the side lots may be built upon, it is folly to waste the best light (that on the street-front,

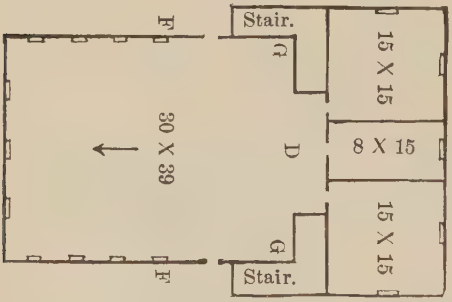

FIG. 37.

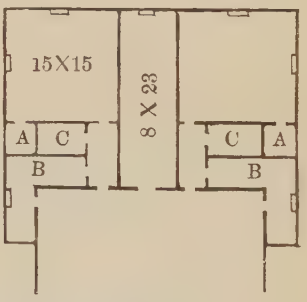

FIG. 38.

in cities, may be called such) by occupying it with corridors. If it be thought necessary to use narrow lots, they should at all events run back to the next street. But the necessity does not exist in any non-metropolitan city.

One of the chief recommendations of a plan like that of fig. 26 is the freedom of exposure to the sun's direct rays. Corner rooms are wholesome to live in, and it seems undesirable to occupy that part of the plan by staircases, as in fig. 40.

It will be a useful exercise for any one who is concerned in the plan for a new school, to take some of the outlines here given, and try to alter them in accordance with just principles. Take fig. 40 with its simple oblong form, and try to redistribute it; with straight halls going clean through, with corner rooms as many as convenient; with the oblong figure preserved in each room if possible; with 600 square feet floor to each, or nearly that, and more if wished; with dressing-rooms of sufficient size

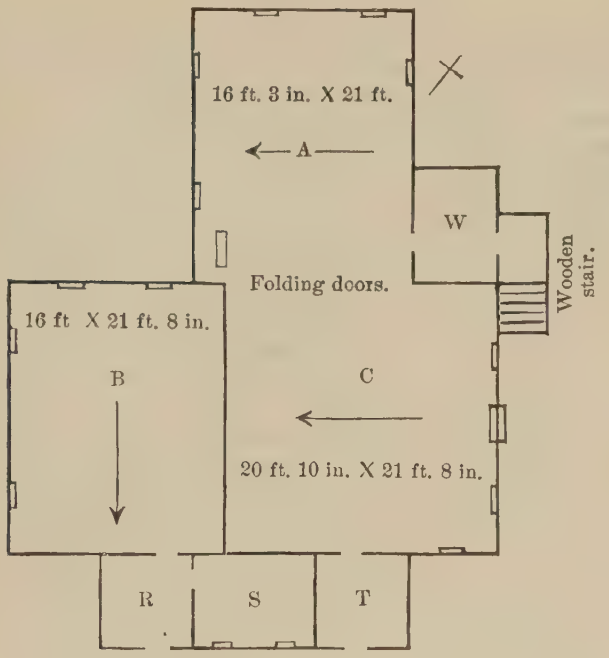

FIG. 39. Brockport Common School, floor plan.

and properly lighted; with no room so packed as to touch other rooms on more than two sides.

PLAN OF A MODEL SCHOOL-ROOM.

The dimensions of rooms for study should not be excessive in either direction. Very large rooms cannot be lighted from one side, which is desirable to avoid cross-light. If both sides are used for windows, the scholars necessarily receive light, one-half from the right hand and one-half from the left. The former is objectionable in writing or drawing because the hand throws a shadow on the page. The ideal room is lighted from one side only (Fig. 8), and its size is limited by this condition; for the height of such a room cannot be placed at more than fourteen feet, and this limits the available width of the room (equals one and one-half times the height of windows) to twenty or twenty-one feet. The width of an aisle being added on the inner side gives twenty-four feet as the maximum

FIG. 40. A room well-shaped for imperceptible ventilation, or for quick change of air when desired. Two doors, four windows. Pupils face in the direction of the arrow.

desirable width for an ordinary school-room. The dimension in the other direction may be greater but is limited by the need of having all the children read words on the blackboard. Thirty-two by twenty-four, and fourteen in height, gives a cubic space of 10,751.

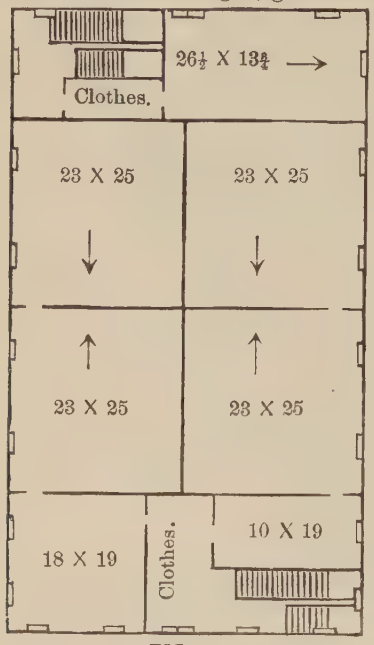

FIG. 40.

The next step is to ascertain how many scholars may safely be placed in the room. That depends on the amount of fresh air that can be introduced. It may be assumed that it will not cause dangerous draughts to bring in enough air (in suitable ways) to change the entire atmosphere once in ten minutes, or six times in an hour. The hourly supply is therefore 64,512 cubic feet of fresh air. Divide this by 1,800, the quantity assumed as required by each schoo'boy, and it follows that thirty-six pupils can be accommodated with sufficient fresh air in that room. In this case each scholar has 300 cubic feet of space, and 21 1-3 square feet of floor-space.

If we assume that air may be admitted more rapidly, viz., so as to change the contents of the room eight times in an hour (which is probably near the maximum of safety), the result is forty-eight pupils and 226 cubic feet of space to each.

If a larger class must be accommodated, the room may be lengthened. A room 25x35 accommodates fifty-four pupils with the above allowance.

The committee of award in the competition for the prize for the best school-house plan (offered by the "Sanitary Engineer") assigned fifteen square feet of floor area as the minimum for each scholar, and the maximum height of rooms as fourteen feet, making a minimum of 210 cubic feet of space with this height, 196 feet with a height of thirteen feet, and so on.

School Desks and Seats.

There is difficulty in ascertaining what is wanted in the case of these articles. Some think that ease and a comfortable support for the body constitute the chief object of a seat; they naturally prefer a seat which tilts back a little, or compels the reader to do so. Others wish the habit of sitting upright to be enforced by the construction of the seat and desk; the inferences drawn from this postulate are various, some wishing to do away with chair backs altogether, and others allowing a support only as far up as the middle of the back, while a narrow strip for the spine alone is used in some (foreign) patterns.

The writer would beg to be excused from deciding between these conflicting views. The truth seems to be that it is desirable for children to be taught how to write in an erect attitude, and that certain of the school chairs, with sloped and curved backs, which are now so common in modern schools, do not assist in doing this, but have rather the contrary effect of tempting to slide into a semi-recumbant posture. Such chairs are not the best to write in, however comfortable for reading. Drawing, copying, ciphering, written exercises, writing (spelling) from dictation, writing in copy-books, and the use of dictionaries, all require an upright position. The shape of a Mexican saddle may suggest something when we are trying to fix on the proper school seat. The lower half or third of the trunk is the part which needs firm support, and the lower eight or ten inches of the back-rest is the most important portion.

The desk is used for two very distinct purposes. In *writing* it must be nearly flat, and its edge should project an inch or two over the front edge of the chair (supposed to be of ordinary width), and the height should be convenient, so that the arms may slide easily over it without raising the shoulders. Too great height of the lid is a common fault. In *reading*, however, it is convenient to have the desk lid tilted a good deal to form a suitable book-rest. Desks are now made (very cheap and good) which enable the scholar to make the change at will.

A point much neglected is the height of the seat for little children, who often have to sit with their feet off the floor. Foot-rests are needed in most young classes.

A desk placed too far from the seat compels the pupil to lean the body forward, elbows on the desk, in postures which are apt to become injurious to the symmetry of the body. There should not be room enough to stand between desks and chairs; on the contrary, as before said, the former should overlap the latter.

The development of near-sight is aided by desks, seats and habits of sitting or writing, which bring the head into a bent position, and the eyes close to the paper. These habits of attitude are extremely common, and nothing is more troublesome than the constant effort to correct them. In fact, nature will assert herself in spite of our efforts, and the best plan may be to cut short the time for writing, or to interrupt it by a minute devoted to calisthenics. In fact, protracted sitting, or confinement to any single posture for more than a few minutes is injurious to young children. The circulation is made stagnant. Odd or distorted attitudes become more so, and the effort to maintain a correct posture becomes irksome.

Site of the School-house.

It may not be amiss to call the attention of trustees to the advantages of choosing wholesome, sunny, sheltered spots of ground for school buildings. It cannot be said that their duty is done when they have provided a good house; the surroundings also (as far as can be controlled) ought to be such as will conduce to the moral and physical well-being of children. Low grounds, where mists prevail, and high bleak spots are

alike to be avoided, if practicable. The science of drainage is now so generally understood that it cannot be necessary to have a "wet cellar," except in rare cases; and in such cases the site should not be used. In damp sites, the flow of underground water toward the cellar may be intercepted by a trench containing drain tile outside the foundation, sunk somewhat lower than the level of the cellar floor; the drain communicates with pipes which leads the water elsewhere. Solid cellar-walls coated outside with coal tar may be used. Good asphalt flooring is desirable; common brick is not only liable to be damp, but often grinds to dust under the feet. A trench cut across the floor and communicating with the outer drains will take off the water under the floor. Such a trench may be filled with common stones and covered over.

In small country schools the practice of raising the school floor some two or three feet above the soil is often followed, and is always to be recommended when no cellar is built. In the wall of the sub-floor space openings should be made which should be left open except in cold weather.

An ample space around the school gives dignity to its effect; and it also insures good light — a point which is one of the most difficult to handle properly in large cities. It seems strange that in towns of a hundred thousand population, or even less, schools built a generation ago should now be so completely shut in by new buildings as to lose more than half their light; but such is the fact in more than one place. It is an inexcusable want of forethought to build with only six or a dozen feet of margin, and with no guarantee that the next lot may not soon be occupied with a high building. Every city hopes to grow; and of late years there is encouraging evidence that cities are beginning to draw the logical inference and to protect their schools from crowding. Another point liable to be overlooked is the prospect of a street becoming a great thoroughfare for business. It is a terrible nuisance to teach in a house near a noisy street in hot weather!

It is undesirable to have the building closely shaded by trees, but a neat arrangement of small trees, shrubs, grass, and even flowers, adds greatly to the respect in which the place is held. Walks may be coated with asphalt or laid with North river flags, for comfort.

SCHOOL WORK.

Those charged with the care of children should bear in mind that, while well-directed study is a positive benefit to health, there are certain ways in which the studies of youth are sometimes injurious.

1. *Amount of Work.*— At present there is a general agreement, or something approaching to it, that thirty hours of study and recitation a week is not far from a correct standard for an average High School pupil. In colleges forty hours are entirely compatible with health. In schools below the grade of High School, five hours a day for five days in the week is a standard, which should be *greatly lessened in the case of the youngest pupils.* Home study, for classes averaging less than twelve years of age, is in many places thought undesirable.

At present, less harm seems to be done by excess of work than by working injudiciously. The reader will doubtless have his own opinion upon the advantages of *competition* as a motive in school, and the possible injuries it may produce.

School examinations affect the pupils more generally; when conducted with severity, and made the test of promotion, they may contain an element of danger; but the most trying thing of all is to crowd them into the very end of a busy spring's work, forcing the severest exertion at a season of general lassitude.

These points are readily understood by experienced teachers, and their enforcement may be left in non-medical hands. At any rate the writer does not offer further discussion of them.

The length of sessions; physical exercise; and recesses, may fall more directly under medical direction. It is quite customary for schools of a high grade to sit five hours continuously, with one or two short recesses. The older the pupils are the better they are suited with this plan; and teachers are almost always pleased with it, as regards their own comfort. It is offered as a suggestion, that, for children under ten years of age, the plan is unsuitable, both as requiring too *much* and too *continuous* application. The long session, in any case, ought to be broken up into sections of not more than about fifty minutes each. At the end of every hour, a break should be made, which after the first and third hours should consist of calisthenics, the pupils of course rising, and the windows being opened as much as the season allows during the exercise. After the second and fourth hours, recesses of ten or twenty minutes, for play and lunch, are desirable. During the latter, no child should be allowed to remain in the room; all should go to a play-room (light, airy and comfortable) or play-ground, under a teacher's charge, while the room is thoroughly aired.

The abolition of recesses has become a popular plan of late. When a school has two daily sessions, it may be an advantage to shorten them in this way — not dispensing, however, with a five minutes' pause in the middle of each session. For little children, frequent recesses and short sessions (three or four hours a day in all) are suitable.

The injurious effects of the use of *tobacco*, and other forms of vicious indulgence, are considerable, and often strike a teacher's eye. The indolence, mental inability and nervous derangement which they cause are known. But there is another cause, much easier to ascertain, and much more remediable, which is perhaps doing more harm than these or than "over-study." I refer to improper habits of diet, which in the case of school-children, include the eating of candy and cake at lunch; neglect to bring lunch for long sessions of five hours; occasionally or frequently omitting breakfast; and drinking immoderately of tea or coffee, sometimes at breakfast, with absolutely no food to accompany it. Would it be believed that an old and prosperous Academy allows (or did lately allow) a vendor of candy and pie to occupy a part of its building for the purpose of selling these articles to the children at lunch? Is it known, or is it even inquired about, how many children rise in the morning after

nights of dissipation and poor sleep, and sit at the breakfast table only long enough to swallow their tea — having "no appetite" for food? They go to school, too, with no proper provision; they have money to buy trash, instead of a wholesome lunch; they "have no stomach for the fight" of school work, and their whole behavior shows their unfitness for work. When these habits are connected with a five-hours' session, so that scholars may practically have to fast until three o'clock P. M., the effect upon the health is disastrous. The evil is definite and unquestionable and the attention of school-authorities is earnestly invited to it.— Very few children are likely to be injured by strong liquors during the school age; but a great many are harmed by strong tea and coffee — articles of doubtful use for minors.

It is well to mention the fact that over-work is particularly dangerous at periods of rapid bodily growth; or while the system has only partially recovered from the shock of severe illness; or in children whose nerves are ill-balanced, as in the case of a tendency to chorea (St. Vitus' Dance).

In the same way, over-work must be avoided with especial care at the age of sexual development. This subject is exceedingly important, and has already attracted great attention.

Due credit being given for each of these points, it remains true that young people inflict on themselves, in the pursuit of social amusement and the practice of accomplishments like piano playing, an amount of strain which in many cases is the sole and sufficient cause of break-down. These matters are beyond the teacher's control.

But in one point it seems to the writer that school authorities are not doing their duty, namely, the physical training of young people, especially those of the female sex. Not that school governors or trustees are to blame, but rather that public sentiment is not sufficiently awakened to the need of such training. The first step toward a right training may be taken, however, by any teacher who understands ordinary calisthenics, and can get permission to devote half an hour of solid time two or three times a week to it. The second step *costs money*, and implies the employment of trained instructors, who ought to have good salaries for their laborious profession. It seems as if there were no other remedy for the terrible want of physical exercise and development which is visible in our own cities, especially among girls.

Finally, there is no doubt that many teachers are severelly strained by their work. School boards ought to consider this point in reference both to present programmes, and prospective improvements — the latter often involving increased labor on the part of teachers. Modern methods of teaching involve much more active and energetic work than the old ways. Teachers of music and drawing are liable to be either carried away with enthusiasm beyond the limit of their strength, or else to be fretted and depressed by the constant contact with inartistic natures. In short, the teacher's life is one which is fully exposed to the dangers of overwork, about which so much is said in the case of children.

REPORT UPON THE PUBLIC SCHOOLS OF SARATOGA SPA, N. Y.

[By Richard Prescott, M. E., Sanitary Engineer.]

May 9, 1885.

To the Secretary of the State Board of Health, Albany, N. Y.:

Sir — In accordance with your request, I have inspected the public schools of Saratoga Spa, N. Y., and have the honor to submit the following report on their sanitary condition:

There are nine buildings used for school purposes, being Nos. 1 to 7 inclusive, the High School, and a building used by the junior department of No. 3. Six of these buildings, viz., High School and Nos. 1, 3, 4, 6 and 7 are brick, and the others, Nos. 2 and 5 and the annex to No. 3 are frame structures. The High School and Nos. 1 (in part), 6 and 7 are buildings very well adapted to their use, but the others are deficient in many respects, sanitarily considered, as will be referred to in another place. The inspection of these various school buildings furnished grounds for the following conclusions.

A. Seating Capacity.

Taking as a standard the minimum limit of fifteen square feet floor area per pupil adopted by the *New York Sanitary Engineer* committee of judges on prize school plans, and assuming the number of pupils to be represented by the seating capacity of the rooms, it appears that schools Nos. 1, 3, 4 and 7 are over-crowded. Thus in No. 1, in the B primary, the area is 10.2 square feet; in the A primary, 9.7 square feet; in the C junior, 13.3 square feet; in the B junior, 13.7 square feet; in the A junior 13.3 square feet; and in the grammar, 14.7 square feet. It is only fair to state that considering the number of pupils present at the time of the inspection, or the average number in attendance, or even the maximum of attendance for the year, there was not a single case of overcrowding; nevertheless seats are provided in sufficient numbers to exceed the limit as given above.

B. Lighting.

The total area of window surface for a school-room should be not less than one-fifth the floor area, and would better be considerably in excess of this limit. In the schools and departments under discussion the relative proportions are as follows:

School No. 1	1–20; 1–9; 1–8
School No. 2	1–6; 1–8
School No. 3	1–8; 1–5; 1–9

School No. 4	1–6; 1–7; 1–7
School No. 5	1–12
School No. 6	1–5
School No. 7	1–9; 1–10
High School	1–10
Annex to No. 3	1–4

This is certainly a very unfavorable showing, and the matter is made more serious by the fact that, except in the high school, the windows are too low, that is, do not extend as near to the ceiling as they should. In the beautiful high school, the windows of the main study hall are high enough, but, unfortunately, the architect has seen fit to fill the upper fourth of each window with ornamental stained glass. This is the more astonishing in view of the fact that the building has been erected less than two years.

In most of the schools the pupils are seated so that the light comes from the back and left, or from the back and both sides. In a few, the light comes from the back and right, and in two rooms the pupils face the windows.

C. HEATING.

Nos. 1 (in part), 2, 3, 5, 6 and 7 and the annex to No. 3 are heated by ordinary stoves which are placed at distances from nearest seats varying from two feet in No. 3, grammar, to five feet in No. 3, annex. In two cases only the stoves were provided with screens to shield the pupils in the vicinity.

No. 1 (in part) is heated by Ruttan stove-furnaces (see paragraph on ventilation).

No. 4 and the high school are heated by steam; No. 4 having direct radiation throughout and the high school a combination of direct and indirect. Several of the rooms in No. 4 have decidedly more radiating surface than is required. The arrangement, too, is open to criticism, since in several instances (in No. 4) individual coils are placed partly in one room and partly in another.

D. VENTILATION.

With few exceptions, the schools inspected are without means for ventilation, other than opening doors and windows. Nos. 1 (in part), 2, 3 (and annex), and 5 are without any ventilating apparatus; No. 4 has a number — five or six to each room — of six inch circular registers at top and bottom, opening, probably, into flues, the upper terminal of which could not be found, although they may probably open into the roof space; at all events, they are entirely useless and no attention is paid to them. Even if there were good flues with a good draught, the registers are absurdly small. Nos. 6 and 7 are provided with registers six inches by seven inches, at top and bottom opening into brick flues, four inches by sixteen inches, that communicate with the roof space. In No. 6 there are two six inch openings in one gable, while in No. 7 there is no opening. In both schools, the upper registers have no cords for opening and shutting, and, as a matter of fact, are never touched. The lower registers are "fixed" in the

morning by the janitors and are not intentionally disturbed. Certainly it could make but little difference with the air in these schools whether the registers were open or shut.

Three rooms in No. 1 are heated and ventilated on the Ruttan system. In each a hot air furnace supplies fresh air drawn from out of doors, while through a register in the floor the foul air is drawn into a flue heated by the furnace smoke pipe. In two of the rooms the foul air register is located at the opposite end of the room to that in which the furnace is situated, and opens into the general space beneath the floor — these rooms being on first or ground floor — and this space communicates with the ventilating chimney. For some inexplicable reason, openings have been made through the walls, connecting these sub-spaces with the outer air, thus destroying the ventilating process and seriously diminishing the heating efficiency of the apparatus. The location of the foul air registers is faulty; they should be close to the furnace in order to realize the greatest benefit from the system. In the third room — a second-story room — the system works well and is deficient in size only.

In the high school, each room has one or more indirect heating stacks supplying fresh warm air, and a number of foul air registers, ten inches by fourteen inches, at top and bottom, opening into narrow brick flues, some of which communicate with a chimney fifteen inches by twenty-six inches, and the rest with the roof space. In the cresting on the ridge, a number of small openings give egress to the foul air. This system of ventilation is extremely imperfect, and in certain cases of calm weather must become nearly inoperative. The supply part of the system is all right — could not be improved, but the equally important part of the removal of vitiated air is at fault. In the first place, the flues are in outside walls and are not heated; this of itself is a serious obstacle, since the column of air in a flue must be warm before it will rise; and in the second place, the general roof space acts as a partial cover to the flues, tending to diminish the velocity of the rising column. In two rooms the indirect stacks are supplemented by "Jackson" grates, which is, theoretically at any rate, a good plan. The grates were not in operation at the time of the inspection. A remarkable feature in the two rooms just referred to is that the registers to the indirect stacks are in the floor *under the settees* and consequently more or less covered by the clothing and persons of the pupils.

E. WATER CLOSETS AND PRIVIES.

The high school is provided with automatic flushing hoppers, each one having its one independent cistern, and all are in most excellent condition. I have never seen in schools elsewhere more satisfactory lavatory apparatus environment than in this Saratoga High School, the concrete floors, the partitions, walls, seats, all perfectly clean and neat, the apparatus all really working, the rooms spacious, light and well ventilated — altogether I consider it a model establishment.

All the other schools are provided with privies, and all in an abominable condition. In most cases the girls' privies are clean as far as the

wood work is concerned, but the boys' privies are foul. All have shallow vaults and are usually furnished with a draw box. The boxes and vaults are cleaned at frequent intervals, and chloride of lime is used with no sparing hand, but a privy is a privy still and nothing more. In two instances the privies are very close to the schools; at No. 7, for instance, it is but nine feet six inches from the part of the building used by the junior department and fully commanded by the windows of this room.

Such is the condition of the Saratoga schools with reference to the points named; and it remains for me to suggest for your consideration such improvements as the circumstances indicate.

1. It will be well to reduce the number of seats in the different rooms until there shall be not less than fifteen square feet floor surface for each seat. This will be accomplished in some cases by exchanging the double seats for single ones.

2. The small, old fashioned windows in some of the schools should be replaced with longer ones extending as close to the ceiling as possible. I strongly urge the propriety of removing the stained glass from the high school windows and setting plain glass in its place. The room may not be as beautiful, but the change will be very beneficial to the pupils.

In the two rooms where the pupils face the windows the seats should be changed without delay.

3. The heating and ventilating should be parts of the same system, and my recommendations will accordingly be based on that law. In No. 1, chart and C primary rooms, where the Ruttan system is used, I advise changing the position of the foul air registers, and opening them directly into the ventilating chimney at the same time cutting off all communication between the chimney and the sub-space.

In all those school-rooms using stoves, I recommend the employment of portable furnaces of suitable sizes, taking fresh air from out of doors, while the removal of the vitiated air would be accomplished by running the stove pipe from the furnace up through a ventilating shaft formed of wood and lined with tin. Let there be an Emerson cowl at top of shaft, and let the smoke pipe extend through this cowl and be itself fitted with a small Emerson or with a "Globe" ventilator.

The opening from the room into this shaft should be at the floor level and as near the furnace as possible. The area of the shaft would depend upon its height and the number of pupils in the room. The shafts in schools having more than one room may be clustered and the partitions made of tin alone. If it should be deemed unadvisable by the school authorities to carry out this plan, I suggest that the stoves be jacketed with galvanized iron, leaving a clear space of about six inches, and let the enclosed space be connected with the outer air. This substitute will not give efficient ventilation, of course, but it will introduce fresh air, and will make the distribution of heat more nearly uniform.

The problem of ventilating school No. 4 is decidedly more difficult of solution than is presented by any other school in the place, for the building is already piped for direct radiation, is of very large lateral dimensions and the three stories are entirely unlike in plan. I submit the following

plan of treatment as one that will certainly be successful, although rather expensive.

Let there be erected at each rear corner of the building a brick shaft, one to serve as fresh air shaft, and the other as foul air shaft. Carry the boiler smoke pipe up through the foul air shaft, which is to be capped with an Emerson cowl. The fresh air shaft is to be capped with an intake cowl, and will communicate by branch ducts of tin or galvanized iron, running through cellar, with the indirect stacks. Let there be a small indirect stack for each study room and a tin hot-air pipe extending from the stack to the room. Let there be also a tin pipe extending down from each study room and communicating finally with the foul air shaft. In connection with these changes, the amount of direct radiation in the rooms thus ventilated should be reduced proportionately to the heat introduced with the fresh air.

In the case of the high school, the flues in the walls that now open into the general roof space should be connected at top with two or more flues extending through roof, heated by steam pipes and covered with Emerson cowls.

4. In the matter of water-closets and privies radical and sweeping changes are imperatively demanded. I believe that the privy is an institution nowhere else as strongly to be condemned as when forming an adjunct to a school house, and it is an abomination in any place.

In the basement of school No. 4 there are full facilities for setting up lavatories such as are used in the high school. I strongly advise that these lavatories be duplicated in No. 4, or else that automatic latrines be used. The other schools may be divided into two classes; those located near public water supply and sewers and those not thus situated. For the first class I advise latrines with automatic flushing attachment, placed in an inclosure warmed by a stove.

The present privy inclosures may in most cases be adapted to the new plan with but trifling alterations. The heat from the stove pipe may be used to ventilate the inclosures. For the second class, I recommend a modification of the common dry earth closet as follows: Let there be a capacious box, or bin, attached to the privy building to contain dry coal ashes, and let there be a removal box under the seats. Then let it be the imperative duty of the janitor, not less than twice daily, to cover all excrement with a layer of ashes at least two or three inches in depth, taking care to keep the contents of the box approximately level.

In closing this report I venture to suggest that the Board of Public Instruction would be benefited as would also the teachers and pupils of the schools, if the teachers had brought directly to their attention the general physical principles governing the matter of ventilation.

I desire to express my appreciation of the kindness of Messrs. Cohen, Eddy and Olmstead, school commissioners, who, in the absence of the superintendent of schools, accompanied me to the various schools and rendered much valuable assistance.

All of which is respectfully submitted,

RICHARD PRESCOTT,

Sanitary Engineer.

SUGGESTIONS BY DR. ALFRED L. CARROLL.

Assuming that the number of seats in a school-room represents the number of pupils whom it is intended to admit, the provision for cubic space in all the schools described by Mr. Prescott is insufficient, and in some of them dangerously so. The minimum of fifteen square feet of floor-space, with a ceiling-height of even twelve feet, would allow but 180 cubic feet for each inmate, and it is practically impossible by any ordinary methods of ventilation to maintain reasonable purity of air in a space of such dimensions. The old theory that children needed less pure air than adults is now generally abandoned, and, even where rooms are occupied for only a few hours, at least 2,500 cubic feet of air per hour should be supplied for each person. Most modern sanitarians advise that 250 cubic feet should be the minimum allotment per capita in schools, and this would demand an entire change of the air of the room ten times in each hour to satisfy the most moderate requirements of healthy respiration — a demand which no common mechanical device can fulfill in cold weather. It is thus evident that, under the most favorable circumstances, the atmosphere of school-rooms is less oxygenated than would be permissible for continuous occupation, and for this reason exceptional care is needed to preserve purity of the environment and to prevent access of extraneous contamination from faulty conservancy-methods or other sources of pollution of soil or air. But in most of the schools mentioned in Mr. Prescott's report there is absolutely no provision for change of air except when the warm season may permit aeration by open windows and doors, and in the few instances where artificial ventilating appliances have been introduced, they are either inoperative or, at best, inadequate. To accomplish the end of indoor ventilation it is necessary not only to furnish means for the admission of a sufficient quantity of pure air at a proper temperature, but also for the removal of a corresponding amount of air fouled by respiration and organic effluvia; indeed, the extraction of the foul air is the most important part of the problem to be solved in the majority of instances; and under any system adopted the outlets should equal the inlets in their combined area, which, supposing a forced movement of the air at the rate of from six to eight linear feet per second, should average a square foot for every eight or twelve inmates. It is true that few, even of the best constructed schools, allow more than half of this air supply; but it is nevertheless desirable that the above-named desiderata in respect of cubic space and fresh air supply should be aimed at in all future construction or improvements. It is, moreover, to be borne in mind that the incoming air must be distributed throughout the room so as neither to leave stagnant places, on the one hand, nor, on the other, to create too great variations of the temperature in different parts,

which should be maintained between sixty-six and seventy degrees Fahrenheit.

A "rough-and-ready" mode of testing the impurity of the atmosphere of a room arising from respiration, and one which might easily and advantageously be employed by teachers from time to time, especially toward the close of school-hours, rests on the deposit caused by carbonic acid in lime-water. Not that carbonic acid in itself is dangerous in even larger quantity than is present in an ill-ventilated room, but that its presence, from respiration, is indicative of the corresponding volatilized organic emanations from the body which are directly injurious. Let a transparent bottle of about ten and one-half ounce capacity, which can be procured from almost any apothecary, be filled with the air of the room (this may be effected by first filling it with water and emptying within the room) introduce a tablespoonful of clear lime-water and shake it for a few seconds; if the lime-water be rendered turbid, the atmosphere may be assumed to be unfit for healthy breathing. This method is, of course, not scientifically accurate but it possesses the merit of cheapness and simplicity.

The mechanical means of carrying out the general principles of ventilation are various, and whilst the particular plans suggested by Mr. Prescott would probably be well adapted to the needs of the buildings described, the choice is by no means to be limited to one system, but in all such cases the commissioners or trustees of schools and other public buildings, knowing the ends to be attained, should be guided by the practical advice of a competent sanitary engineer in the adoption of a suitable system for their attainment, each problem having to be considered in relation to its own distinctive circumstances.

As regards lighting, Mr. Prescott's criticisms and recommendations deserve approval. It is desirable that the conjoined area of windows should be not less than one-fourth of the floor-space, and that, as far as practicable, the light should come from the left and above. At all events, no desks should be placed facing the windows, and cross-lights should be avoided. If any alteration be made in the seating arrangements, it would be advisable to provide for an adaptation of the relative heights of chairs and desks to the size of the pupils. Seats which can be raised or lowered may be procured at very reasonable cost.

Mr. Prescott's suggestions concerning the conservancy-systems seem to be the simplest and least expensive that could be devised for their purpose, and there can be no doubt that the privies described by him should be immediately replaced by safe and more civilized appliances.